

ABSTRAK

Maftuhah, Lailatul. 2023. *Analisis Kadar Protein Dan Lemak Larva Black Soldier Fly (BSF) Menggunakan Media Pakan Fermentasi Kulit Buah Kakao (Theobroma cacao) Sebagai Sumber Belajar Biologi*. Skripsi, Program Studi Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Muhammadiyah Jember.
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Kata Kunci: Kadar protein dan lemak, fermentasi kulit buah kakao, larva BSF, sumber belajar biologi

Proporsi terbesar dari berat buah kakao adalah kulitnya dengan persentase 75,65%. Pemanfaatan kulit buah kakao yang telah diterapkan adalah pengolahan kulitnya menjadi sabun, ditimbun, atau didegradasi menggunakan larva BSF yang menghasilkan kasgot untuk dimanfaatkan sebagai pupuk. Namun larva BSF tidak memiliki enzim pendegradasi lignin yang terkandung dalam kulit buah kakao, sehingga memerlukan proses pengurangan kandungan lignin yang dapat dilakukan dengan cara fermentasi menggunakan EM4 (*Effective Microorganism-4*) yang dapat memecahkan *lignin* dan *selulosa*. Fermentasi memiliki peran untuk meningkatkan kualitas nutrisi limbah. Larva BSF merupakan insekta yang dapat mengubah limbah menjadi protein sebesar 40%.

Masalah penelitian ini adalah bagaimana pengaruh fermentasi kulit buah kakao terhadap kadar protein dan lemak larva BSF dan bagaimana manfaatnya sebagai sumber belajar biologi. Penelitian ini bertujuan untuk mengetahui pengaruh pemberian pakan fermentasi limbah kulit buah kakao terhadap kadar protein dan lemak larva BSF dan dapat mengetahui kelayakan sumber belajar yang dikembangkan. Penelitian ini dilakukan di Pusat penelitian Kopi dan Kakao Indonesia, SMA Negeri 2 Jember, dan Universitas Muhammadiyah Jember. Metode penelitian ini menggunakan Rancangan Acak Lengkap (RAL) menggunakan 3 perlakuan yang terdiri dari pemberian pakan limbah kulit buah kakao tanpa fermentasi (F0), fermentasi 7 hari (F7), dan fermentasi 14 hari (F14).

Hasil penelitian dianalisis menggunakan uji ANOVA dan dilanjutkan dengan uji lanjut Tukey pada taraf kepercayaan 95%. Hasil penelitian yang diperoleh kadar protein larva BSF sebesar 49,76% (F0), 59,32% (F7), dan 49,79% (F14). Sedangkan kadar lemak larva BSF sebesar 7,23 % (F0), 7,23 % (F7), dan 7,49 % (F14). Fermentasi kulit buah kakao dapat dimanfaatkan sebagai pakan larva BSF serta dapat mempengaruhi kadar protein dengan kadar tertinggi pada limbah F7 ($p < 0,05$), namun tidak mempengaruhi kadar lemak larva ($p > 0,05$). Diperoleh Hipotesis satu H_0 diterima hipotesis dua H_0 ditolak. Berdasarkan hasil penelitian pengembangan yang telah dilakukan, dapat disimpulkan bahwa E-Handout yang telah dikembangkan sangat valid berdasarkan kriteria validasi ahli materi dengan presentase 93,8% (sangat valid), ahli media dengan presentase 84,4% (valid), dan praktisi dengan presentase 100% (sangat valid). Hal ini dapat dinyatakan bahwa E-Handout layak digunakan dalam proses pembelajaran dengan rata-rata 92,73%.

ABSTRACT

Maftuhah, Lailatul. 2023. *Analysis of Protein and Fat Content of Black Soldier Fly (BSF) Larvae Using Fermented Cocoa Pod (Theobroma cacao) Feed Media as a Source for Learning Biology*. Thesis, Biology Education Study Program, Faculty of Teacher Training and Education, Muhammadiyah University of Jember.

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Keywords: Protein and fat levels, cocoa pod fermentation, BSF larvae, biology learning resources

The biggest proportion of the weight of the cocoa pods is the shell with a percentage of 75.65%. The use of cocoa pod shells that have been applied is processing the skins into soap, stockpiling them, or degrading them using BSF larvae which produce cassava to be used as fertilizer. However, BSF larvae do not have lignin degrading enzymes contained in cocoa pod shells, so they require a process of reducing lignin content which can be done by means of fermentation using EM4 (Effective Microorganism-4) which can break down lignin and cellulose. Fermentation has a role to improve the nutritional quality of waste. BSF larvae are insects that can convert waste into protein by 40%.

The problem of this research is how does cocoa pod fermentation affect protein and fat content of BSF larvae and how is it useful as a source of learning biology. This study aims to determine the effect of feeding cocoa pod waste fermentation on protein and fat content of BSF larvae and to determine the feasibility of the learning resources being developed. This research was conducted at the Indonesian Coffee and Cocoa Research Center, SMA Negeri 2 Jember, and Muhammadiyah University Jember. This research method used a completely randomized design (CRD) using 3 treatments consisting of feeding cocoa pod waste without fermentation (F0), 7 days of fermentation (F7), and 14 days of fermentation (F14).

The research results were analyzed using the ANOVA test and continued with the Tukey test at the 95% level of confidence. The results of the study obtained BSF larvae protein levels of 49.76% (F0), 59.32% (F7), and 49.79% (F14). Meanwhile, the fat content of BSF larvae was 7.23% (F0), 7.23% (F7), and 7.49% (F14). Fermentation of cocoa pods can be used as feed for BSF larvae and can affect protein levels with the highest levels in F7 waste ($p < 0.05$), but does not affect larval fat content ($p > 0.05$). It is obtained that the one H0 hypothesis is accepted, the two H0 hypothesis is rejected. Based on the results of the development research that has been carried out, it can be concluded that the E-Handout that has been developed is very valid based on the validation criteria of material experts with a percentage of 93.8% (very valid), media experts with a percentage of 84.4% (valid), and practitioners with a percentage of 100% (very valid). It can be stated that the E-Handout is feasible to use in the learning process with an average of 92.73%.