Utilizing Alloferon Peptide to Improve Growth Performance and Survival Rate of Mealworms (Tenebrio molitor) in Mass-Scale Insect Farming

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The constant increase in world population raises serious questions regarding our capacity to provide an adequate food source. In addition, the increasing demand for food, especially animal-based protein, is adversely impacting the environment in terms of greenhouse gas emissions, water, energy, and land usage. As a solution for these problems, insects are considered as a potential new, environment-friendly food source. This study aims to evaluate the effect of alloferon on the growth performance and survival rate of mealworms. In the experimental process, yellow mealworms were grown in three different dietary groups fed with wheat bran only, plain gel, or alloferon gel. The effect of alloferon diet on mealworm growth, survival, and development pattern were measured, and histologic findings were analyzed in vivo. Then, alloferon diet on mealworm protein expression was analyzed in vitro by SDS-PAGE and LC-MS assay. In week 10, mealworm larvae fed on gelatin and alloferon supplement were 39.5 %-90 % heavier than those fed on wheat bran only, while the development time of mealworms in the experimental group was shortened up to 20.6 %-39.6 % on alloferon gelatin diet, compared to the control group with wheat bran diet. Furthermore, the Alloferon-containing gelatin diet showed a remarkably increased number of hemocyte population in hemolymph fluid and thickened outer cuticle layers compared to other groups. Finally, the SDS-PAGE and LC-MS assay revealed a significant amount of phenoloxidase induced in mealworm body tissue. The present study shows that alloferon improved the development time and survival rate of mealworms by regulating phenoloxidase expression, and the technique might be considered a favorable solution for production in the insect breeding industry.

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