Development of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) on Three Different Artificial Diets and Controlling Effect with Chemical-free Pesticides[1]

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Abstract

Fall Armyworm (FAW) is a lepidopteran pest that newly invaded Taiwan in 2019. It is imperative to establish an effective integrated pest management for it. In order to establish a method of mass rearing in the laboratory, the optimal artificial diet formula for fall armyworm were sorted out. In addition, non-chemical materials control effect was evaluated to meet organic farmer's demand. Three artificial diets were conducted to feed FAW from neonate larvae to pupation stage while fresh corn leaves as a control group. In this study, DA, DB and DC artificial diets represented *Spodoptera litura* artificial diet, FAW artificial diet and modified recipe from FAW artificial diet, respectively. The results showed that the larval period, pupal weight and pupal stage were 20.4 d, 220.7 mg and 9.0 d respectively while treated with DC. The performance on larva and pupa of DC formula was the best followed by DA formula. Accordingly, both DC and DA artificial diet could applied for mass rearing in laboratory. In terms of non-chemical control trial, it revealed synergic effects on combination of *Bacillus thuringiensis* and neem oil for controlling fall armyworm. The mortality of FAW larvae treated with the above combination after 7 d was 98.9%, which was significantly higher than the mortality 30.6-45.9% and 47.6% as treated with *B. thuringiensis* and neem oil respectively. However, applying above materials in the field was not such efficient as it in the laboratory. It was supposed that the frequency of materials application might be a key factor to be control. Furthermore, it need to be combined with other non-chemical technique for enhancing the controlling effect.

Keywords: *Spodoptera frugiperda*, artificial diet, growth performance, *Bacillus thuringiensis*, neem oil.

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