



Research Article

Development of Protein Based Artificial Diet for Mass Rearing of *Spodoptera frugiperda* J.E. Smith (Lepidoptera: Noctuidae)

Agha Mushtaque Ahmed^{1*}, Ali Zachi Abdul Qadeer Alhilifi², Fahad Nazir Khoso¹, Muhammad Ibrahim Kubar¹, Tehniyat Naz Shah³ and Touseef Ahmed¹

¹Department of Entomology, Faculty of Crop Protection, Sindh Agriculture University, Tando Jam, Sindh, Pakistan; ²Department of Plant Protection, Basrah University, Iraq; ³Department of Zoology, University of Sindh, Jamshoro, Pakistan.

Abstract | Fall armyworm (FAW) *Spodoptera frugiperda* (J.E. Smith) is one of the significant insect pests of agricultural crops due to its polyphagous nature. The plants on which it feeds possess variable chemical and physical properties which may influence its biology particularly for growth and reproduction. This study evaluated the growth and fecundity of *S. frugiperda* on artificial diets. The FAW larvae were reared on two distinct composed artificial diets (bean D1 and chickpea flour D2) and one natural diet D3 (fresh and healthy maize leaves). In both artificial diets, only the flours were different, while the rest of the ingredients remained the same. Sixty first instar larvae were introduced in a Petri dish to observe larval duration, larval weight, and adult fecundity. Each larva was offered 0.5 mg of diet in a plastic cup and replaced after every 24 hrs. A prominent effect of different diets on larval development was noticed. The survival percentage was 100% on D3. The difference ($P < 0.05$) was much noticeable in early larval stages from L1 to L3. The overall larval duration was maximum 18.2 ± 0.23 days on D1. The maximum larval and pupal weight were 491.1 ± 19.41 mg and 261 ± 10.19 mg on Diet 2. In last, the highest oviposition period was 5.7 ± 0.10 days found on D2. The maximum number of egg masses 23.11 ± 2.5 with the highest fecundity of 1758.61 ± 245.9 eggs was noted on D3. The impact of larval and pupal body weight on adult's oviposition of *S. frugiperda* was correlated (larva $r^2 = -0.84$ & pupa $r^2 = -0.79$) that showed a negative with non-significant difference ($P > 0.05$). Thus, based on the findings in the present study, it is concluded that D2 (chickpea flour) was much appropriate for FAW rearing as it produced short larval developmental period, maximum body weight with efficient oviposition. Further it is suggested; more future research should be conducted in order to know the impact of artificial diet on FAW during lab condition.

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***Correspondence** | Agha Mushtaque Ahmed, Department of Entomology, Faculty of Crop Protection, Sindh Agriculture University, Tando Jam, Sindh, Pakistan; **Email:** maagha@sau.edu.pk

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Introduction

Maize (*Zea mays* L.) is the third most vital cereal crop and staple food of many countries. In

Pakistan during 2017-2018, maize was cultivated on 1.65 m ha having 6.43 million tones production annually (FAOSTAT, 2021). It is known as the Queen of cereals due to its extremely productive impending