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Rearing of Maize Stem Borer, *Chilo partellus* (Lepidoptera: Crambidae) under Laboratory Conditions

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ABSTRACT

Maize is an important cereal crop grown for food, fodder and raw material throughout the world. It is rick source of proteins, carbohydrates and vitamins. Maize production is decreasing day by day due to attacked of more than 250 insect species and mites. Among insect pests, maize stem borer, Chilo partellus is most destructive pest for maize production. The rearing of maize stem borer, C. partellus was conducted under laboratory conditions in National Agricultural research Centre (NARC) Islamabad. The complete metamorphosis (egg, larva, pupa and adult) was recorded in C. partellus. The mean value of egg was 4.67 ± 1.09 days. There were six larval instar of C. partellus and total larval period was 18-48 days. The growth period of first, second, third, fourth, fifth and sixth larval instar was 3-6, 2-6, 3-7, 3-8, 3-9 and 5-11 days respectively on maize leaves. The mean average duration of pupa was 9.00±2.25 days. The female was long lived than male. The total developmental period from egg to adult was 30-65 days.

Keywords: *Maize, Maize stem borer, Lepidoptera, Life cycle, Complete metamorphosis.*

INTRODUCTION

Maize (*Zea mays*) is an important cereal crop which cultivated for fodder, food and also for raw material in various industries (Khan et al., 2010; & Tajamul et al., 2016). The production of this crop is decreasing now a days due to various biotic factors such as pathogens and insect pests (chewing and sucking) all over the world including Pakistan.

Among biotic factors, insect pests especially maize stem borer, *Chilo partellus* is the major threat for maize production in various countries (Khan et al., 2007; Tamiru et al., 2011; & Peddakasim et al., 2018). *C. partellus* is widely distributed in all maize growing areas of the world (Bhanukiran & Panwar, 2000; Shukla & Kumar, 2005; & Farid et al., 2007) including Pakistan (Yonow et al., 2017). The larvae of *C. partellus* feed on the vegetative as well as reproductive stages of maize by making holes in stem and leaf windowing (Panwar et al., 2000; Thippeswamy et al., 2010; & Mutyambai et al., 2015b).

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Larvae can damage the central shoot resulting dead heart and even cause death (Panchal & Kachole, 2013; & Zala & Patel, 2020). During severe attack of pest 20-40% yield losses occur (Songa et al., 2001; & Ahad et al., 2008).

The basic knowledge about the pests is play key role in adopting best strategies against them. According to review of literature done by various researchers, the available data on this pest is lacking basic information such as biological parameters or biology. By keeping in view, the current rearing study of maize stem borer was conducted so that effective management strategies should be adopted against this pest.

MATERIALS AND METHODS

Study area

The larvae were collected from different areas of National Agricultural research Centre (NARC) Islamabad Punjab Pakistan.

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The collected larvae were brought to laboratory for rearing purpose. The fresh maize leaves were kept into plastic containers and 10 larvae shifted into that plastic containers. The lid of each plastic containers was tightly covered with muslin cloth to avoid the larval escape. The food of larvae was changed after 2 days of interval as per need. Larvae were observed on daily basis for pupation and pupae were collected. The collected pupae were kept into separate container and observed their emergence on daily basis. Emerged adults were shifted into oviposition cage which lined with white paper at bottom and with leaves of maize plant at sides for egg lying. Leaves were observed changed on daily basis. Eggs were collected by cutting leaves and white paper into small pieces. The collected eggs were shifted into petri dishes for hatching. After 4-6 day, eggs hatched and 1st instars larvae were then shifted to rearing jars with maize leaves as food. The whole cycle of current pest from egg-adult was recorded during the whole study.

RESULT AND DISCUSSION

Maize is cultivated at large scale and consider an important cereal crop throughout the globe. It is third most important cereal crop after rice and wheat. It is cultivated in all seasons such as summer, rabi and kharif. It has been reported that Kharif crop play more contribution (90%) in maize production as compared to other seasons (1-2%). The production is highly affecting with serious insect pests and diseases. More than 139 insect pest species are attack on the maize crops. Among insect pests, maize stem borer, *C. partellus* is major threat for crop production (Prakash et al., 2017; & Kumar & Alam, 2017).

Before adopting any effective strategy such as cultural, chemical and biological (Ramzan et al., 2019) to control current pest, the basic knowledge about pest is very important. For this purpose, the current study was conducted to check the biological parameters of maize stem borer, *C. partellus*. The rearing of pest was performed under laboratory conditions.

The flat and oval shape creamy white eggs were laid by maize stem borer on dorsal and ventral side of leaves. The colour of eggs was yellowish and yellowish brown after two and three days of egg lying, respectively. The incubation period of eggs was 4.67 ± 1.09.

There were six larval instar of *C. partellus* and total larval period was 18-48 days. The growth period of first, second, third, fourth, fifth and sixth larval instar was 3-6, 2-6, 3-7, 3-8, 3-9 and 5-11 days respectively on maize leaves. The early instars (1st instar) were small in size, slender, dirty white with dark brown head. The larval body was covered with hairs. The colour of second and third instar larvae was dirty white and dull white, respectively. The head of second and third instar larvae was dark brown and brown, respectively.

The colour of fourth, fifth and sixth larval instar was translucent white body, dull white and reddish brown, respectively. The mean average duration of pupa was 9.00±2.25 days. The developmental period of each life stage of maize stem borer *Chilo partellus* was given (Table 1). The similar findings about larval description had been reported by many

researchers (Lella & Srivastav, 2013). The little variations about developmental parameters of larvae were recorded between current study and early researchers studies. The variations may be due to geographical variations (Divya et al., 2009).

Table 1: Developmental period of different life stages of maize stem borer *Chilo partellus*

Parameters	Mean ± SD	Range (days)
Eggs		
Egg period	4.67 ± 1.09	3 – 5
Larval duration		
1st instar	3.00 ± 0.69	3-6
2nd instar	4.00 ± 1.83	2-6
3rd instar	5.20 ±1.85	3-7
4th instar	4.80 ± 2.26	3-8
5th instar	5.1 ± 2.38	3-9
6th instar	6.3 ± 2.23	5-11
Total larval period	33.9 ± 11.33	18-48
Pupa		
Pupa	9.00±2.25	5–11
Total life cycle		
Egg-Adult emergence	43.49 ± 11.4	30–65
Adult to longevity		
Female	6.00 ± 1.45	3 - 9
Male	5.02 ± 1.00	4 - 8

The male longevity was 4-8 days while female longevity was 3-9 days. The female was long lived as compared to male. Siddalingappa et al. (2010) had reported the similar findings about adult longevity. The total life period of pest from egg to adult was completed in 30-65 days which is not inline with the findings of some researchers (Marulasiddesha, 1999; & Siddalingappa et al., 2010). They had reported that pest completed life cycle in 30-69 days. These variations may be due to some environmental conditions or food.

Conflict of interest

Authors declare no conflict of interest.

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