

Mating behaviour of fall armyworm, *Spodoptera frugiperda* on maize crop

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Maize (*Zea mays*) is a staple food in many countries and the total production of maize crop exceeds that of wheat and rice. Maize is widely cultivated throughout the world. In 2018, total world production was 1.15 billion tonnes led by the United States with 34.2 percent of total. The susceptibility of the crop to the pests, results large yield losses. Among them a novel pest fall armyworm became an insidious challenge across the world in production of maize.

In India, it was for the first time spotted in the maize research fields of the University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka (Ashokan *et al.*, 2018). In Chhattisgarh, *Spodoptera frugiperda* was first reported at IGKV, Raipur (Deole and Paul, 2018). For the successful, efficient management of the pest there is a need to know behaviour. Hence, a study is being proposed with the objective of understanding the mating behaviour of the fall armyworm, *Spodoptera frugiperda*, on maize crop and effect of mating duration on fertile eggs percentage.

The investigation on mating behaviour of fall armyworm, *Spodoptera frugiperda* (J. E. Smith) was conducted in the Biocontrol laboratory of Department of Entomology, Indira Gandhi Krishi Vishwavidyalaya Raipur, Chhattisgarh during the period of July to November, 2019 under *invitro* conditions (25 ± 2 °C, 70 ± 10 % RH).

The study was conducted by using completely randomized block design (CRD) with ten replications. For the study of mating behaviour, maize plants ('PRO-4212' cultivar) were grown in plastic pots and each pot was equidistantly covered with a metal pipe cage frame bearing a fine mesh screen. For the collection of adult moths, nucleus culture of fall armyworm was maintained first. The trial was conducted when the maize plant, attained the 5-leaf stage. Each replication was performed by using a pair of male and female adult moth of fall armyworm. One pair of, recently emerged unmated (<24 hr) male and female moths of *S. frugiperda* were release into each cage. Ten per cent honey solution on a cotton swab was placed inside each cage for the

moth to feed on. Moths were maintained in their cages. Observation on mating *viz.* time and duration of mating were carried out in interval of every one hour.

The observations were taken by recording the duration of copulation. The observation regarding the percent of fertile eggs were calculated by following formula –

$$\text{Percent of fertile eggs (\%)} = \frac{\text{No. of total fertile eggs}}{\text{Total number of eggs}} \times 100$$

The observation on preferred time and duration of mating of *S. frugiperda* were investigated and revealed that the mating occurred throughout the 24hours cycle, with majority of copulation starting at the evening hours spanning until 10:00 pm. The duration of copulation varied from 42 to 73 min with an average of 57.60 ± 3.49 min. Most of copulations (70%) lasted longer than 50 min. (Table 1). The percent of fertile eggs was also recorded during the experiment. It was noted that the percent of fertile eggs higher, when the mating duration was longer (Fig. 1). This is suggestive, that the longer mating duration might be associated with transfer of more sperms that are used to increase the fertility of eggs like in case of 8th replication, when mating takes place for 73 hours, the percent of fertile eggs was also higher, (i.e. 99.59 percent). The present findings confirm that, in case of *Spodoptera frugiperda*, most of the copulations (80%) lasted longer than 45 min, which corroborates with the findings of Marti and Simmons, 1992, who also reported that the mean duration of mating averaged 130 min.

Table 1. Percent of fertile eggs with respect to duration and preferred time for mating in moths of *S. frugiperda*.

S. N.	Duration (Min)	Time of mating (IST)	No. of eggs laid by female moth after mating	No. of fertile eggs	Percent of fertile eggs
1.	71	19:32 to 20:43	471	467	99.15
2.	47	08:07 to 08:54	262	203	77.48
3.	42	19:15 to 19:52	203	141	69.45
4.	60	20:31 to 21:31	293	270	92.15
5.	63	19:01 to 20:04	299	281	93.97
6.	57	20:37 to 21:34	279	245	87.81
7.	45	11:55 to 12:00	251	197	78.48
8.	73	18:11 to 19:24	493	491	99.59
9.	67	19:27 to 20:34	269	253	94.05
10.	51	19:53 to 20:44	271	230	84.87

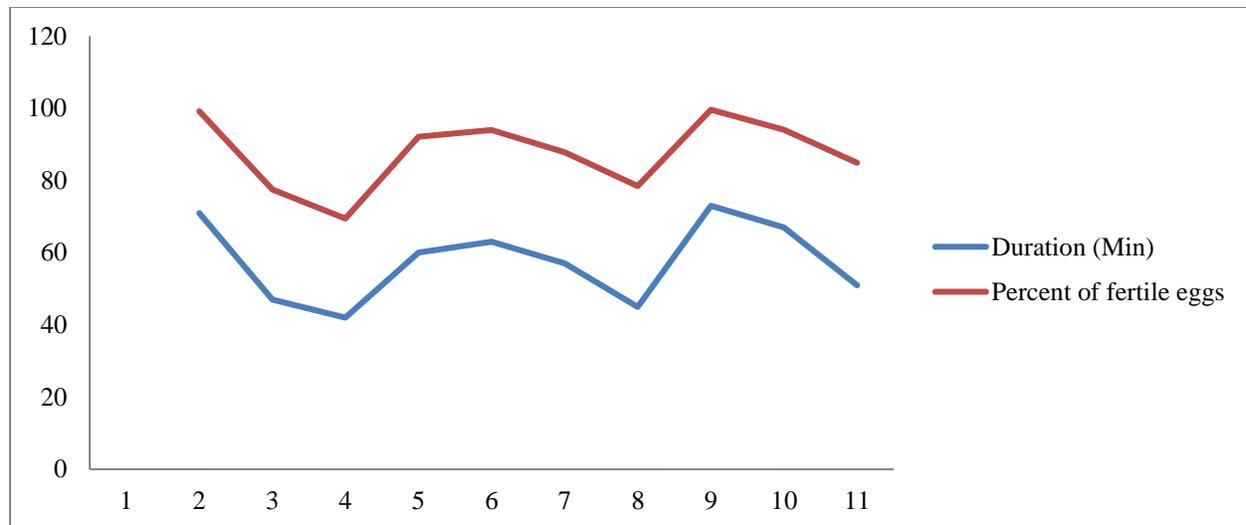


Fig. 1: Relationship between the duration of mating and percent of fertile eggs

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