

COMPARATIVE BIOLOGY OF FALL ARMYWORM, *SPODOPTERA FRUGIPERDA* (J. E. SMITH) (LEPIDOPTERA : NOCTUIDAE) ON MAIZE AND SORGHUM AS HOSTS

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ABSTRACT : The current report of *Spodoptera frugiperda* (J. E. Smith) from India is alarming because of its polyphagous nature. The goal of the present investigation was to study the biology of fall armyworm on two different hosts, maize and sorghum to understand the host preference. The investigations on comparative biology of *S. frugiperda* were carried out at the Main Agricultural Research Station (MARS), UAS Raichur, Karnataka during 2019-20 cropping season. Results revealed that longer developmental time, less fecundity, lower morphometrics (head capsule length and width, body length and width), lower pupal weights and higher mortality when reared on sorghum compared to maize. This clearly indicates that maize is a nutritionally preferred host when compared to sorghum.

Key words : Comparative biology, maize, sorghum, *Spodoptera frugiperda*.

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INTRODUCTION

In recent years, India has been invaded by a new insect pest, Fall Armyworm (FAW), *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae), that has become a major threat by causing severe damage to maize. In addition to maize, it has also been reported to infest more than 300 other plant species (CABI, 2020). Among them, the most preferred host plants are maize, rice, sorghum and sugarcane (Bueno *et al*, 2010). A total of 353 larval host plants of *S. frugiperda* were recorded belonging to 76 plant families, principally Poaceae (106), Asteraceae (31) and Fabaceae (31) (Montezano *et al*, 2018).

The fall armyworm, *S. frugiperda* is a major pest of maize (*Zea mays* L.) and was previously restricted only to the Americas (Cruz *et al*, 1999). A severe outbreak of FAW in maize was reported from African countries such as Sao Tome, Nigeria, Benin and Togo in 2016 (Goergen *et al*, 2016). Subsequently, the pest has spread rapidly to over 44 countries in sub-Saharan Africa causing significant damage to crops (Prasanna *et al*, 2018). Recently, this dreaded pest has been reported from

Karnataka in India on maize crop (Ganiger *et al*, 2018; Sharanabasappa *et al*, 2018). In addition to maize and sorghum, it also feeds on hybrid sorghum, fodder sorghum, bajra, sugarcane, cotton, Napier grass and *Rottboellia* sp. (Mallapur *et al*, 2021). Similarly, the occurrence of this pest in severe form was also noticed in maize growing areas of Raichur. By reviewing the devastating character of this insect, the current study was executed at the University of Agricultural Sciences, Raichur, Karnataka, India.

MATERIALS AND METHODS

The fully-grown larvae of *S. frugiperda* were collected from the maize ecosystem and reared to maintain the mother culture throughout the study period. A pair of healthy and robust male and female moths were selected from mother culture and were introduced into a cage (60 × 50 × 50 cm) which was preliminarily provided with 15-20 days old maize and sorghum seedlings for egg-laying. The adults were provided with 10 per cent honey solution along with yeast as food. At the same time, seedlings were replaced regularly and previous seedlings were observed to check the egg-laying by an adult female.

Table 3 : Morphometrics of different larval stages of *Spodoptera frugiperda* reared on maize and sorghum as hosts. (n = 20)

		Maize				Sorghum			
		Length (mm)		Width (mm)		Length (mm)		Width (mm)	
		Range	Mean \pm SD	Range	Mean \pm SD	Range	Mean \pm SD	Range	Mean \pm SD
1	I instar	1.41-1.96	1.69 \pm 0.18	0.18-0.27	0.22 \pm 0.02	1.10-1.37	1.20 \pm 0.10	0.10-0.40	0.22 \pm 0.12
2	II instar	3.62-4.69	4.13 \pm 0.30	0.20-0.61	0.57 \pm 0.10	2.15-4.96	3.86 \pm 0.97	0.20-0.59	0.47 \pm 0.10
3	III instar	5.57-7.99	7.22 \pm 0.59	0.58-0.96	0.75 \pm 0.12	5.12-7.62	6.79 \pm 0.97	0.51-0.68	0.59 \pm 0.06
4	IV instar	15.71-18.95	16.46 \pm 0.73	1.13-1.97	1.58 \pm 0.28	14.15-16.75	15.78 \pm 0.95	1.00-1.83	1.29 \pm 0.25
5	V instar	20.76-23.94	21.46 \pm 0.73	2.12-2.84	2.48 \pm 0.25	19.12-21.65	20.73 \pm 0.92	2.05-2.81	2.30 \pm 0.30
6	VI instar	27.17-29.79	28.33 \pm 0.94	4.10-4.98	4.46 \pm 0.33	25.15-27.68	26.65 \pm 0.98	4.02-4.82	4.30 \pm 0.28
7	Pre pupa	19.04-21.82	20.57 \pm 0.50	3.03-3.99	3.47 \pm 0.32	19.12-19.66	19.25 \pm 0.13	3.14-3.90	3.31 \pm 0.28
8	Pupa								
	Male	17.15-20.72	18.94 \pm 0.75	7.04-9.00	7.91 \pm 0.60	15.16-17.27	16.78 \pm 0.80	6.12-6.93	6.32 \pm 0.24
	Female	18.04-21.98	19.81 \pm 0.88	8.02-9.42	8.77 \pm 0.45	16.13-18.36	17.73 \pm 0.84	7.04-7.96	7.40 \pm 0.28
9	Adult								
	Male	13.18-16.93	15.05 \pm 0.72	5.05-6.01	5.43 \pm 0.29	13.14-15.21	14.37 \pm 1.00	4.10-4.86	4.46 \pm 0.29
	Female	15.09-18.91	17.01 \pm 0.82	6.07-7.17	6.40 \pm 0.30	14.13-16.37	15.66 \pm 0.89	5.30-5.94	5.53 \pm 0.30

Table 4 : Weight of different stages of *Spodoptera frugiperda* reared on maize and sorghum as hosts. (n = 20)

S. No.	Stages	Weight (mg)			
		Maize		Sorghum	
		Range	Mean \pm SD	Range	Mean \pm SD
1	III instar	36-78	56.95 \pm 12.88	31-65	47.65 \pm 7.09
2	IV instar	177-255	213.65 \pm 23.74	142-184	176.40 \pm 9.47
3	V instar	286-482	366.55 \pm 53.55	273-354	329.60 \pm 20.39
4	VI instar	501-596	538.90 \pm 25.60	463-543	491.75 \pm 24.48
5	Pre pupa	405-475	442.30 \pm 20.61	317-478	404.60 \pm 47.19
6	Pupa				
	Male	180-290	257.80 \pm 33.95	150-282	218.00 \pm 35.34
	Female	200-309	251.75 \pm 28.93	168-303	228.05 \pm 42.22
7	Adult				
	Male	110-148	125.10 \pm 11.06	71-129	90.75 \pm 12.49
	Female	128-192	150.45 \pm 15.90	105-162	119.45 \pm 13.74

Head capsule width

It varied from 0.25 \pm 0.04 to 3.24 \pm 0.06 mm on maize and 0.19 \pm 0.07 to 2.37 \pm 0.07 mm on sorghum from first to sixth instar larva (Table 2).

Body length

It varied from 1.69 \pm 0.18 to 28.33 \pm 0.94 mm on maize and 1.20 \pm 0.10 to 19.25 \pm 0.13 mm on sorghum from first to sixth instar larva (Table 3).

Body width

It varied from 0.22 \pm 0.02 to 4.46 \pm 0.33 mm on maize and 0.22 \pm 0.12 to 4.30 \pm 0.28 mm on sorghum from first to

sixth instar larva (Table 3).

Weight

It varied from 56.95 \pm 12.88 to 538.90 \pm 25.60 mg on maize and 47.65 \pm 7.09 to 491.75 \pm 24.48 mg on sorghum from third to sixth instar larva (Table 4).

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