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RESEARCH ARTICLE

Evaluation of host plant preferences of *Spodoptera frugiperda* (JE Smith): Insights into oviposition and feeding behaviour

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Abstract

Spodoptera frugiperda (JE Smith) (Lepidoptera: Noctuidae) commonly known as fall armyworm (FAW), is an invasive pest of maize. It is highly polyphagous, with an expanding host range of nearly 353 plant species across more than 76 families. In this study the feeding preference and ovipositional preference of FAW were evaluated on ten host plants, such as rice, maize, black gram, castor, sesame, onion, tomato, cotton, tobacco and cluster bean. The results of feeding preference studies indicated that, both the 2nd and 3rd instar had a much greater preference for maize, with a mean number of 6.60 larvae/leaf (2nd instar) and 7.20 larvae/leaf (3rd instar) settling after 24 hr out of 20 larvae released. This was followed by castor having a mean number of 4.60, 4.40 larvae/leaf for 2nd and 3rd instar, respectively. Zero feeding preference was observed in cluster bean and rice. In the ovipositional preference studies, maize showed the highest preference, recording a mean of 24.33 egg masses (526.70 eggs/mass) in the no-choice test and 12.33 egg masses (489.00 eggs/mass) in the free-choice test. Black gram recorded the lowest number of egg masses (1.00), with 66.00 eggs/mass in the free-choice test, while castor had the lowest (6.67 egg mass with 64.75 eggs/mass) in the no-choice test.

Keywords: : fall armyworm; feeding preference; host plants; ovipositional preference

Introduction

The fall armyworm, *S. frugiperda* (JE Smith) (Family: Noctuidae; Order: Lepidoptera) is a polyphagous invasive pest of global significance, native to tropical and subtropical regions of the Americas (1). This pest was first detected in West Africa in 2016, from where it rapidly spread to various regions, including several Asian countries such as China, Bangladesh, Indonesia and Korea (1). In the Indian subcontinent, it was first reported in Karnataka in 2018 and was subsequently observed from Chhattisgarh, Gujarat, Maharashtra, Odisha and West Bengal (2). In India, a total of 170,000 ha of maize is estimated to have been affected by the FAW, across 10 states (3).

The FAW has two distinct strains: the rice strain and the corn strain (4). Although these strains are morphologically similar, they differ in their host preferences. The corn strain primarily feeds on crops like maize, cotton, sorghum, whereas the rice strain feeds on rice and other pasture grasses (2). Single nucleotide polymorphisms (SNPs) in the mitochondrial *COI* gene and nuclear *Tpi* gene are typically used to distinguish between the two strains (2). The pest thrives in warm and humid conditions, with a minimum temperature requirement of 10 °C for development. Egg hatching occurs within 2-4 days at a temperatures ranging from 21-27 °C (5). The optimal temperature for larval development is 28 °C, whereas pupation occurs at a slightly lower threshold of 14.6 °C (6).

Fall armyworm is known for its sporadic infestation patterns and strong migratory behaviour. An adult moth can fly up to 100 km in a single night (7). Its dispersal ability, high reproductive rate (900-1,000 eggs per female) and short generation time (30 days) are key traits that contribute to the pest's successful proliferation (8). These traits have facilitated its spread across nearly 353 host plants from 76 crop families, including many cultivated crops. Nearly 30 % of the affected crops belong to the Poaceae family (9). Among these hosts, maize-often referred to as the "Queen of Cereals"is one of the pest's primary targets. The larvae cause skeletonization, defoliation and stem boring, resulting in significant crop losses (10). A plant is considered a true host of *S. frugiperda,* if it attracts gravid females for oviposition and supports complete larval development. Therefore, it is of primary importance to identify the host plants that are highly preferred for oviposition and larval feeding, which is crucial for understanding the pest's host range and for managing its spread effectively.

This study examines the ovipositional and feeding preferences of *S. frugiperda* across ten diverse crop species, representing major agricultural ecosystems such as cereals, pulses, oilseeds, vegetables and industrial crops.

Materials and Methods

The study was conducted in the Fall Armyworm Laboratory at the Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore. The larvae and pupae required for the study were sourced from a diet-based culture maintained in the laboratory. The artificial diet used for rearing comprised of the following ingredients which were divided into three parts. Part A - lab lab, wheat germ, yeast, ascorbic acid, sorbic acid, distilled water and methy - p hydroxy. Part B - agar agar and distilled water, Part C- tetracyclin, formaldehyde and zincovit (11). The experiment was carried out under controlled conditions of 28±5 °C, 70±10 % relative humidity (RH). Ten diverse host plants were selected for the study (Table 1). These host plants were raised in pots under insecticide free conditions and were used for the experiments.

Feeding preference studies

Free choice tests (2nd and 3rd instar) were conducted to determine the preference of larvae between different host plants. Feeding preference was determined based on the larvae's attraction to, settlement on and feeding activity on the leaves of various host plants.

Leaves from each host plant were collected and cut into small leaf pieces of 3-5 cm. A 1 % agar solution was prepared and poured into the bottom of a 15 cm diameter Petri plates, allowing it to solidify. The solidified agar served to prevent leaf discs from drying out. The leaf discs were arranged evenly around the perimeter of the Petri plate, maintaining equal spacing (Fig. 1). Twenty larvae, previously reared on an artificial diet-based culture, were released at the centre of each plate. The Petri plates were securely closed to prevent larval escape.

Table 1. Host plants used in the study.

S. No.	Host plant	Variety	Age of the plants used (days)
1.	Rice	CO 55	45-50
2.	Maize	CO(H)M 8	30-35
3.	Black gram	VBN 8	30-35
4.	Castor	YRCH 2	45-50
5.	Sesame	VRI 4	45-50
6.	Onion	Local	30-40
7.	Tomato	PKM 1	45-50
8.	Cotton	CO 17	40-45
9.	Tobacco	Local	40-45
10.	Cluster bean	MDU 1	40-45

The number of larvae present on each host plant was recorded at intervals of 30 mins, 1 hr and 24 hr, after release. The 2nd and 3rd instar larvae were used and five replications were maintained for each group to assess the feeding preferences following the method described earlier (12). Host plants that attracted few or no larvae and remained largely uneaten after 24 hr were considered not preferred or less preferred hosts.

Ovipositional preference studies

Ovipositional preference refers to the tendency of female moths to choose specific host plants for egg-laying, which is crucial for the survival of their offspring. Based on the preference-performance hypothesis, female moths tend to select oviposition sites that offer optimal nutritional quality for their offspring, resulting in accelerated development, increased biomass and improved reproductive potential of *S. frugiperda* adults (13, 14). To study oviposition preference among different host plants, both no-choice and free-choice tests were carried out under laboratory conditions in ovipositional cages. The experiment followed a completely randomized design (CRD) with 10 treatments and three replications.

No-choice test

The ovipositional preference of *S. frugiperda* was evaluated under laboratory conditions with three replications using ovipositional cages of dimension 45 cm x 60 cm x 60 cm (15). The host plants were placed in 250 mL conical flasks, filled with water to prevent desiccation. Six pairs of moths were used per replication. Pupae were separated as male and female using a microscope and maintained in separate containers until adult emergence. Upon emergence, the moths were released into the ovipositional cages. Cotton soaked in 10 % honey solution was placed in small glass containers inside the cages to serve as adult feed. For each treatment, a single host plant was provided, thereby eliminating any alternative oviposition sites. Observations were made daily for seven days, starting two days after moth release. Egg masses were collected daily and the number of egg masses as well as the number of eggs per mass were recorded under a light microscope (10X magnification).

Free-choice test

Free-choice tests were conducted in large ovipositional cages under laboratory conditions with three replications. For each replication, six pairs of moths were released. Pupae were separated as male and female and kept in separate containers until adult emergence, after which the moths were introduced into cages (15). As in the previous test, cotton soaked in honey

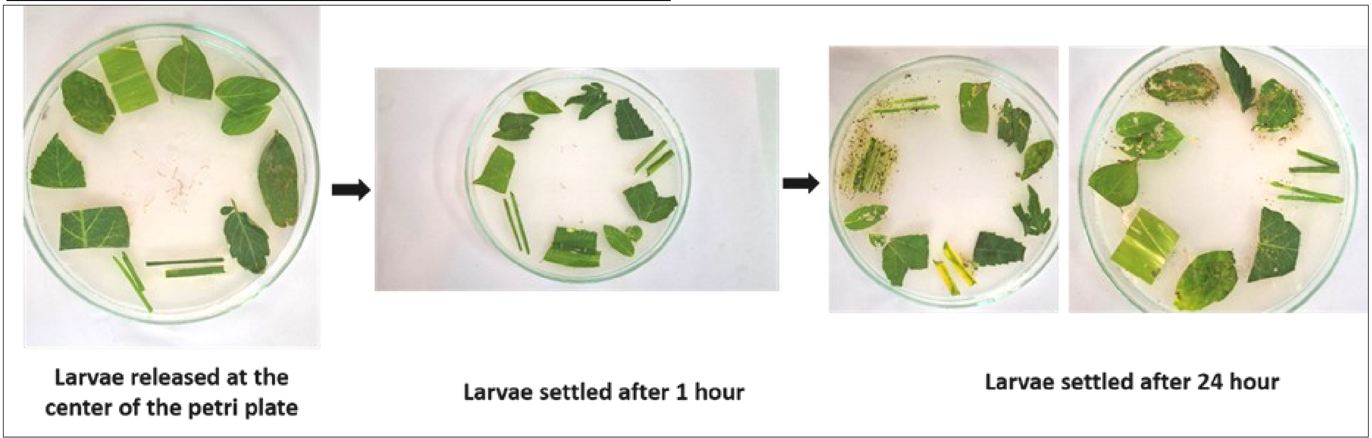

Fig. 1. Experimental setup for assessing the feeding preference of FAW.

solution was placed in small containers inside the cages. Host plants were randomly arranged within the cages, allowing female moths to freely choose oviposition sites. Plants were replaced with fresh ones whenever they became dry. After a two-day mating period, eggs were collected daily for seven days. The number of egg masses was recorded and eggs per mass were counted using a light microscope (10X magnification; Leica Stereoscope EZ4).

Statistical analysis

The data were analysed using the statistical package for applied sciences (SPSS) software, version 22. Data such as the number of egg masses (ovipositional studies) and number of larvae (feeding preference studies) were square root transformed to stabilize variance and normalize the distribution, ensuring valid statistical analysis. Results were compared at a significance level of $p < 0.05$. Parametric data were compared using one-way ANOVA (analysis of variance) and the means were compared using the post-hoc Tukey test at a 5 % significance level.

Results

Feeding preference studies

The feeding preference results showed that larvae, after being released in the centre of the Petri plate, migrated towards various host plants (Table 2). The 2^{nd} instar FAW larvae displayed the following host selection pattern: the mean number of larvae recorded was highest on maize leaves (5.20 larvae/leaf), followed by castor (4.00 larvae/leaf). The next most preferred hosts were black gram (2.20 larvae/leaf) and sesamum (1.60 larvae/leaf) at 30 mins after release. The mean number of larvae was lowest on cotton and rice (0.20 larvae/leaf) at the same time point.

This preference pattern remained relatively consistent at 1 hr and 24 hr after release, with maize remaining the most preferred host (6.20 larvae/leaf at 1 hr; 6.6 larvae/leaf at 24 hr), followed by castor (4.20 larvae/leaf at 1 hr; 4.60 larvae/leaf at 24 hr). Preference towards cluster bean gradually decreased over time- starting at 0.60 larvae/leaf at 30 min, 0.40 larvae/leaf at 1 hr and dropping to 0.00 larvae/leaf at 24 hr-indicating it became a non-preferred host. Other less preferred hosts were tomato (0.20 larvae/leaf) and rice (0.80 larvae/leaf). At the end of 24 hr, cluster bean and cotton were not preferred (0.00 larvae/leaf) (Fig. 2).

The preference pattern exhibited by the 3^{rd} instar larvae are as follows: initially at 30 min after release, preferences were higher for maize (4.80 larvae/leaf), followed by castor (3.20 larvae/leaf), black gram (2.60 larvae/leaf) and sesamum (2.00 larvae/leaf). After 24 hr, the preferences exhibited by the 3^{rd} instar larvae closely mirrored those of the 2^{nd} instar. Maize remained the mots preferred host (6.60 larvae/leaf at 1 hr; 7.20 larvae/leaf at 24 hr). Similarly, castor (4.40 larvae/leaf at 24 hr) and black gram (3.20 larvae/leaf) showed high preference, with no significant difference between them. Fewer larvae were observed in tobacco (0.60 larvae/leaf) and cotton (0.80 larvae/leaf) indicating a lower preference for these hosts. At the end of 24 hr, rice and cluster bean showed no larval presence, indicating they were not preferred by the 3^{rd} instar larvae.

The overall preference pattern for 2^{nd} instar larvae was maize > castor > black gram > sesamum > tobacco > onion > rice > tomato > cluster bean= cotton. For 3^{rd} instar larvae, the preference pattern was maize > castor > black gram > sesamum > onion = tomato > cotton > tobacco > rice = cluster bean. Both 2^{nd} and 3^{rd} instar FAW larvae showed a strong preference for maize and castor. In contrast, rice, cluster bean and cotton consistently recorded lower number of larvae, indicating them as the least preferred hosts for feeding.

Table 2. Feeding preference of *S. frugiperda* on different host plants under free choice condition.

S. No.	Host plant	30 min		60 min		24 hr	
		2^{nd} instar	3^{rd} instar	2^{nd} instar	3^{rd} instar	2^{nd} instar	3^{rd} instar
1.	Rice	0.20 (0.81)^{e}	0.20 (0.81)^{f}	0.20 (0.81)^{f}	0.20 (0.81)^{ef}	0.80 (1.09)^{def}	0.00 (0.71)^{f}
2.	Maize	5.20 (2.39)^{a}	4.80 (2.29)^{a}	6.20 (2.58)^{a}	6.60 (2.66)^{a}	6.60 (2.66)^{a}	7.20 (2.77)^{a}
3.	Black gram	2.20 (1.64)^{bcd}	2.60 (1.76)^{abcd}	2.60 (1.76)^{bc}	3.20 (1.91)^{b}	2.80 (1.79)^{bc}	3.20 (1.91)^{b}
4.	Cluster bean	0.60 (1.02)^{de}	0.00 (0.71)^{f}	0.40 (0.88)^{ef}	0.00 (0.71)^{f}	0.00 (0.71)^{f}	0.00 (0.71)^{f}
5.	Castor	4.00 (2.12)^{ab}	3.20 (1.91)^{ab}	4.20 (2.17)^{ab}	3.80 (2.07)^{b}	4.60 (2.25)^{ab}	4.40 (2.21)^{b}
6.	Sesamum	1.60 (1.41)^{bcde}	2.00 (1.57)^{bcde}	2.00 (1.55)^{cd}	1.40 (1.37)^{c}	2.20 (1.61)^{cd}	1.60 (1.44)^{c}
7.	Tobacco	1.20 (1.26)^{cde}	1.20 (1.30)^{cdef}	1.80 (1.50)^{cd}	1.00 (1.23)^{cd}	1.40 (1.37)^{cde}	0.60 (1.02)^{def}
8.	Onion	1.00 (1.19)^{cde}	0.80 (1.09)^{ef}	0.60 (1.02)^{def}	0.80 (1.12)^{cde}	1.00 (1.16)^{def}	1.00 (1.19)^{cde}
9.	Tomato	0.80 (1.12)^{cde}	0.80 (1.12)^{ef}	0.40 (0.91)^{ef}	1.00 (1.23)^{cd}	0.20 (0.81)^{ef}	1.00 (1.23)^{cd}
10.	Cotton	0.20 (0.81)^{e}	1.00 (1.23)^{def}	0.20 (0.81)^{f}	0.40 (0.91)^{def}	0.00 (0.71)^{f}	0.80 (1.12)^{cde}
11.	Not on any leaf	3.00 (1.74)^{abc}	3.40 (1.89)^{abc}	1.40 (1.37)^{cde}	1.60 (1.43)^{c}	0.40 (0.91)^{ef}	0.20 (0.81)^{ef}
	SE	0.22	0.18	0.17	0.13	0.18	0.13
	CD (0.05)	0.45	0.37	0.34	0.25	0.36	0.25

Means with same superscript are not significantly different from each other (Tukey's test, p=0.05).

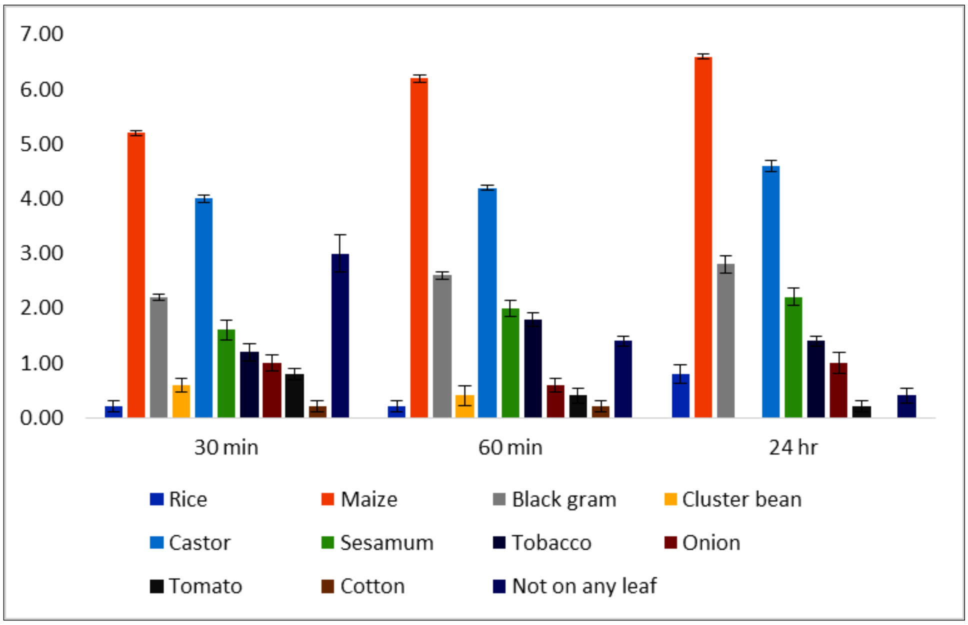

Fig. 2. Feeding preference exhibited by the 2nd instar larvae.

Ovipositional studies

The results of the ovipositional studies revealed significant differences in egg-laying preference of *S. frugiperda* among the tested host plants under both no-choice and free-choice tests (Table 3; Fig. 3).

No-choice test

A higher number of egg masses was recorded on maize (24.33), which also exhibited a greater number of eggs per mass (526.70). This was followed by sesamum (21.67), tobacco (20.67) and rice (17.00). A lower number of egg masses was observed on castor (6.67), followed by cotton (7.33) and cluster bean (11.00). Although rice recorded fewer egg masses compared to sesamum and tobacco, it showed a higher number of eggs per mass (384.42). Among the ten host plants, onion (174.34), tobacco (167.88) and sesamum (152.76) exhibited comparatively higher mean eggs per mass, next to maize and rice. Cotton (67.76), cluster bean (66.29), castor (64.75), black gram (60.36) and tomato (58.37) were grouped under the same statistical cluster and had lower number of eggs per mass.

Free-choice test

Under free-choice conditions, *S. frugiperda* exhibited variable ovipositional preferences across the ten tested host plants (Fig. 4). Maize was the most preferred host, recording the highest number of egg masses (12.33) and eggs per mass (489.00). Maize was followed by rice, which had 6.00 egg masses with a mean number of 352.00 eggs per mass. Subsequently, a higher ovipositional preference was observed for onion and tobacco with onion having 4.00 egg masses (283.33 eggs/mass) and tobacco registering 3.00 egg mass (257.00 eggs/mass). Conversely, minimal preference was noticed for black gram having only 1.00 egg mass (66.00 eggs/mass). Following black gram, other crops, namely cluster bean, tomato (1.33), cotton (1.67) and castor (2.33) recorded low egg mass counts, indicating they were among the least preferred hosts for oviposition by the FAW.

Table 3. Ovipositional preference of *S. frugiperda* towards different host plants under no choice and free choice conditions.

S. No.	Host plant	No choice test		Free choice test	
		No. of egg mass	No. of eggs per mass	No. of egg mass	No. of eggs per mass
1.	Rice	17.00 (4.18 ± 0.06)^{bc}	384.42 ± 11.67^{b}	6.00 (2.54 ± 0.11)^{b}	352.00 ± 5.85^{b}
2.	Maize	24.33 (4.97 ± 0.23)^{a}	526.70 ± 9.37^{a}	12.33 (3.58 ± 0.12)^{a}	489.00 ± 6.24^{a}
3.	Black gram	11.33 (3.44 ± 0.12)^{cde}	60.36 ± 5.83^{d}	1.00 (1.22 ± 0.00)^{e}	66.00 ± 4.58^{e}
4.	Cluster bean	11.00 (3.39 ± 0.08)^{def}	66.29 ± 2.43^{d}	1.33 (1.34 ± 0.11)^{de}	86.00 ± 20.29^{e}
5.	Castor	6.67 (2.67 ± 0.16)^{f}	64.75 ± 4.96^{d}	2.33 (1.66 ± 0.21)^{cde}	156.67 ± 11.89^{de}
6.	Sesamum	21.67 (4.70 ± 0.15)^{ab}	152.76 ± 17.14^{c}	3.33 (1.95 ± 0.08)^{bcd}	231.67 ± 11.21^{cd}
7.	Tobacco	20.67 (4.60 ± 0.12)^{ab}	167.88 ± 6.64^{c}	3.00 (1.84 ± 0.25)^{bcde}	257.00 ± 30.55^{bc}
8.	Onion	16.33 (4.10 ± 0.10)^{bcd}	174.34 ± 4.49^{c}	4.00 (2.11 ± 0.13)^{bc}	283.33 ± 13.69^{bc}
9.	Tomato	12.67 (3.62 ± 0.12)^{cd}	58.37 ± 2.07^{d}	1.33 (1.34 ± 0.11)^{de}	70.33 ± 9.52^{e}
10.	Cotton	7.33 (2.78 ± 0.22)^{ef}	67.76 ± 4.96^{d}	1.67 (1.46 ± 0.11)^{cde}	113.00 ± 42.14^{e}
	SE	0.19	10.99	0.19	27.22
	CD (0.05)	0.40	23.09	0.41	57.19

Means with same superscript are not significantly different from each other (Tukey's test, p =0.05).

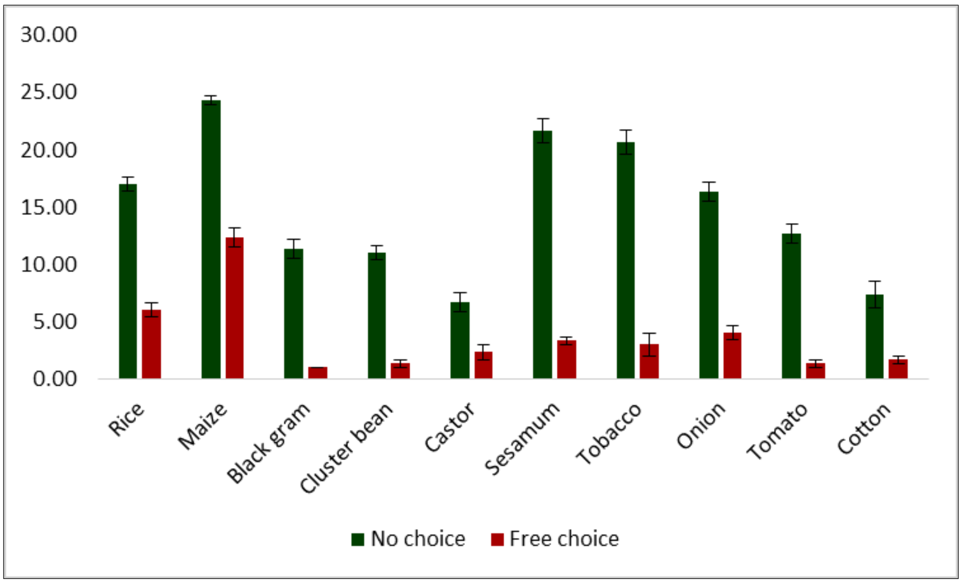

Fig. 3. Number of egg masses in ovipositional study under no choice and free choice conditions.

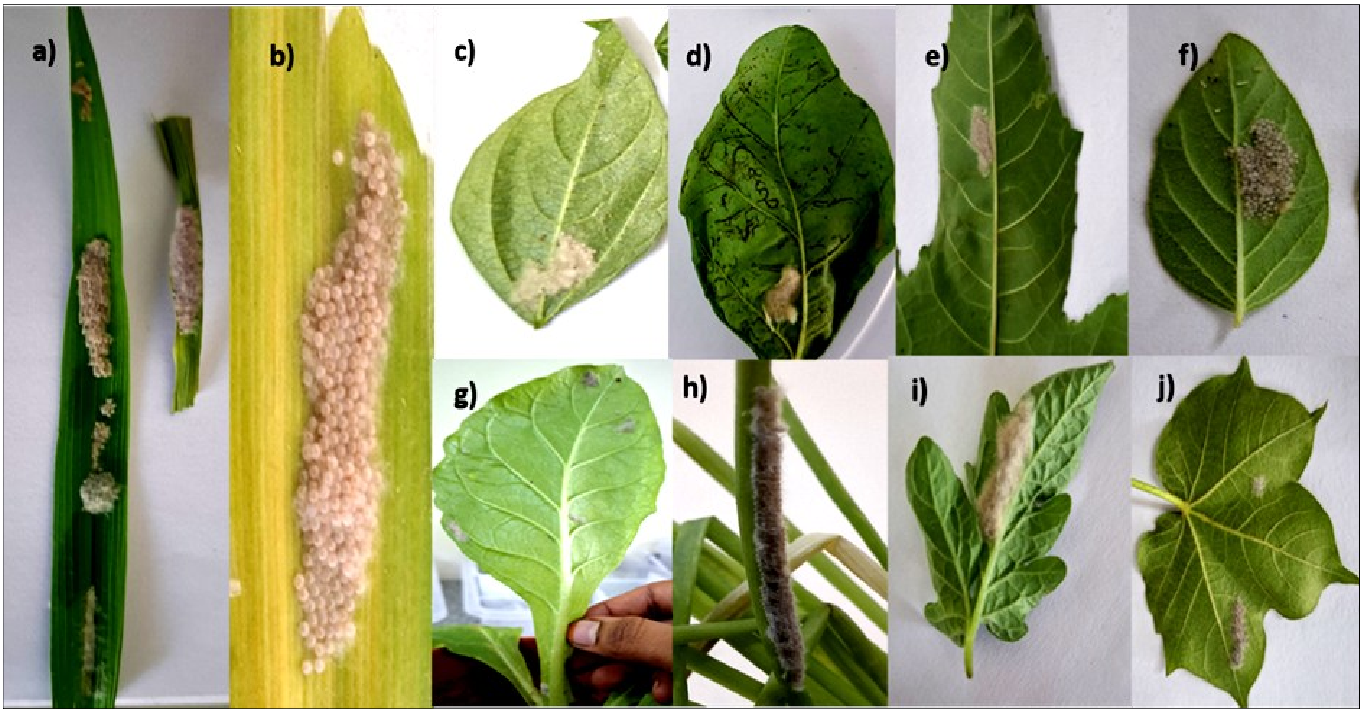

Fig. 4. Egg masses in free choice test (**a**) rice, (**b**) maize, (**c**) black gram, (**d**) cluster bean, (**e**) castor, (**f**) sesamum, (**g**) tobacco, (**h**) onion, (**i**) tomato and (**j**) cotton.

Discussions

Feeding preference studies

Feeding preference studies revealed a strong affinity of *S. frugiperda* for maize and castor, with lesser attraction to cotton and tobacco. These findings are consistent with earlier reports identifying maize as the most preferred host. High larval attraction was observed towards both maize and castor, while crops like cotton were less preferred, aligning with the trends noted in this study (15). Another study also concluded that the 1st and 3rd instar larvae of FAW were significantly more attracted to maize within just one hr of release in multi-choice assays (16). The elevated crude protein, dry matter and ash contents in castor and maize likely contributed to the strong preference of *S. frugiperda* larvae towards these host plants. Indices denoting the larval performance, such as relative consumption rate, relative growth rate and consumption index also positively correlated with the nutritional contents of the host plants suggesting the suitability of maize and castor as a host for FAW (17).

Rice was identified as less preferred compared to other potential host plant species, consistent with the trends observed in this study (18). Laboratory studies have shown that FAW larvae did not feed on rice, reinforcing the idea that rice is among the least preferred hosts (19). The leaf surface roughness of rice may contribute to reduced feeding and survival (20). The results indicating lower feeding preference for cotton agree with earlier findings, which concluded that although FAW can complete its development on crops like cotton and pigeon pea, these remain less preferred hosts (21). Tobacco was also identified as a less preferred host in multi-choice test, aligning with earlier findings indicating that larvae developing on tobacco had a low survival rate of 8.13 %, confirming that its low survivability reduces its suitability as a host (22).

Despite the expanding host range of FAW, maize remains the most preferred and suitable host. However, as breeding programs continue to focus on increased yield and productivity, newer varieties that are developed are losing its defensive traits due to selective breeding strategies (23). The non-preference towards a particular host may be due to a combination of various factors, such as poor nutritional content, structural defences or repulsive chemical cues (24).

Ovipositional studies

The ovipositional preference studies revealed significant variation in egg-laying preferences across crops. Maize was identified as the most suitable host for oviposition under both choice and no-choice conditions. These findings agree with earlier reports indicating a higher ovipositional preference for maize over crops like tobacco and potato (22). This preference is attributed to maize's high nutritional content, soft leaf texture and attractive volatiles. This trend is further supported by studies showing that in no-choice, two-choice and multiple-choice tests, maize along with para grass and Napier grass was highly favoured by FAW for oviposition compared to the other hosts (25). This signifies that FAW tends to resort to alternative hosts only in the absence of maize (26).

Similar results were observed in previous studies, where maize was identified as the most preferred host for both oviposition and feeding, while tomato was among the least preferred crops (27). In tomato plants, the presence of glandular trichomes has been associated with reduced attraction of whiteflies for oviposition (28). This trait may similarly contribute to the decreased oviposition by the FAW. Additionally, the suitability of maize for oviposition was further highlighted, with fodder maize receiving over 782.33 eggs, reinforcing its status as a highly favoured oviposition host (29). These findings collectively highlight maize as the primary host for FAW, with other plants serving as secondary options under specific conditions.

Host selection by FAW towards maize is strongly influenced by certain plant volatiles. Studies have revealed that (Z)-3-hexenyl-acetate is a key plant-emitted volatile that significantly influences the host selection and oviposition behaviour in the FAW. This compound is detected by the olfactory receptor *Sfru*OR23, which is predominantly expressed in the antennae, underscoring its vital role in the insect's chemosensory-driven recognition of hosts for oviposition and feeding (30). Other than maize, there are over 106 host plants of FAW belonging to the Poaceae family (9). Earlier research observed that FAW rice strains preferred to oviposit on grasses rather than corn or other surfaces, indicating a general preference for grasses (31). Since rice is a member of the Poaceae family, this supports its potential role as a host. Further studies refer that FAW larvae were able to survive on 2-week-old rice plants, with a low survival rate of 8 %. This suggests that rice, while less favourable, can still support limited oviposition and larval development reflecting its low suitability as a host (20).

The study recorded lower oviposition on cotton, further supporting the present findings (32). In the present study, black gram exhibited the fewest egg masses, aligning with previous research that found black gram to be the least preferred host in ovipositional preference studies involving monocot and dicot plants. That study noted no egg masses on black gram under no-choice conditions, with oviposition predominantly concentrated on monocots such as rice (33).

The first report of FAW infestation in onion in India, particularly in a maize-onion cropping sequence in Maharashtra, was documented in 2023 (34). In our study, onion was preferred for oviposition by FAW next to maize and rice. Similar to N-dipropyl disulfide, a volatile compound in onion which acts as an attractant for onion flies (*Delia antiqua*), it is possible that certain volatile compounds emitted by onion such as dipropyl trisulphide, propyl disulphide and methyl propyl disulfide identified in onions may also influence oviposition behaviour in FAW (35).

Host selection by the FAW is influenced by various factors, including behavioural plasticity, the presence of competitors and natural enemies (36). In the absence of the most preferred host plants, FAW tend to choose a less preferred host such as black gram, castor or cotton. If an adult female lays its eggs on a non-preferred host plant and the resulting offspring are able to survive, that plant can still be considered a host (37). If offspring survivability occurs on a particular host, there is a possibility that the pest may colonize and establish itself on that crop, thereby posing a potential threat to its cultivation.

Conclusion

The comprehensive evaluation of *S. frugiperda* feeding and ovipositional preferences across 10 major crops reaffirms that maize is the most preferred host for both larval feeding and egg-laying. This study not only reinforces the pest's strong association with maize but also highlights its adaptability, posing a potential risk to a broader spectrum of crops. Interestingly, crops such as castor exhibited a comparable feeding preference to maize yet demonstrated relatively lower ovipositional attractiveness. This distinction between feeding and oviposition preferences provides critical insights for integrated pest management strategies, especially in mixed cropping systems. The notably increased ovipositional preference for onion underscores the pest's adaptability and expanding host range, while the low preference for black gram in multi-choice ovipositional studies suggests its relative resistance. These findings emphasize the need for vigilant monitoring and further in-depth studies on *S. frugiperda* host dynamics across varied cropping systems. Understanding its preferences among diverse crop groups are vital for crafting effective, region-specific management strategies against this invasive pest.

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Authors' contributions

All authors contributed to the study conception, design and manuscript preparation. SRS carried out the experiments, recorded and analysed the data and wrote the manuscript. NB structured and supervised the experiments and edited the manuscript. TS, RR and SKM critically reviewed the manuscript. All authors provided feedback on earlier versions of the manuscript and have read and approved the final version.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None.

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