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Research Article

Host Preference of Armyworm, *Spodoptera litura* under Laboratory Condition

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Abstract

Spodoptera litura is a polyphagous pest that destroy the agricultural and horticultural crops, especially maize, okra, cabbage, and cotton in the globe. There are different host pantons that *Spodoptera litura* feed. The current study was conducted to check the host preference of pest on different hosts. The study resulted in the feeding preference of *Spodoptera litura* in cabbage followed by okra and alfalfa. The growth and development of pest was significantly shorter on cabbage and could complete properly on cabbage leaves than other tested hosts (okra and alfalfa). The mean developmental period of 1st, 2nd, 3rd, 4th, 5th, and 6th larval instar on cabbage was 3.30, 3.40, 3.61, 4.33, 6.44, and 5.29 days, respectively, while 4.00, 3.59, 4.69, 4.43, 6.99, and 6.68 days on alfalfa, respectively. The total developmental period of 1st-6th larval instar on cabbage, alfalfa and okra was 26.19, 33.74 and 29.38 days, respectively. The survival rate, fecundity, fertility and longevity of *Spodoptera litura* were higher in cabbage. Therefore, cabbage was recorded as the most suitable and preferable host for its population growth.

Keywords: *Spodoptera Litura*; Biology; Morphology; Cabbage; Okra; Feeding Preference

Introduction

Armyworm, *Spodoptera litura* (Lepidoptera: Noctuidae), is a polyphagous pest of several agricultural and horticultural crops all over the world including Pakistan. It has been distributed throughout the world especially in tropical, subtropical and temperate areas of the world [3,12,14]. Several plant species attacked by the current pest including cotton, maize, barley, wheat, potato, tomato, brinjal, okra, sesame, and alfalfa [5,13,20], and several weeds. The biological parameters of this pest are highly dependent on the type of food. During high infestation of pests, 26-100% of economic losses of crops occur in developed and undeveloped countries [1,9,11,15].

Spodoptera litura has a strong reproductive capacity, sturdy ecological model, intense era overlap, and irregular outbreaks, which pose an extreme threat to the secure manufacturing of asparagus. Numerous studies have tested that exceptional hosts that insects feed on have effects on their growth and improvement, fecundity, weight, and dietary stage. Similarly, feeding on one-of-a-kind parts of hosts also influences insect feeding conduct, viability, and fecundity [16,18,22]. For example, -a-kind of maize tissue extensively affected the boom, improvement, and fecundity of *Spodoptera frugiperda*. For instance, [7] used soybean organs at exceptional reproductive ranges to assess their resistance toward *S. litura*. [21] explored the host selectivity of *S. litura* on distinctive boom periods of cabbage and soybeans. [24] studied the results of *S. litura* feeding at the protective enzyme activities in leaves at specific parts of kidney bean vegetation. At the equal time, there were additionally many reports of the growth and improvement.

A study of the host preference of *S. litura* using different host plants is very important before adopting any control measure. Several studies have been conducted by many researchers in the world, especially in India, and many other Asian countries not in Pakistan. For this purpose, the current study was conducted.

Materials and Methods

The current study was conducted to check the host preference of the armyworm, *Spodoptera litura* by using different host plants such as cabbage, okra and alfalfa. The host preference of pest was checked in this study. The host plants were taken from different fields and used in the experiment after washing with water and drying. The immature stages of the pest were collected from the different fields of farmers and brought to the laboratory for rearing purposes and further experiments. The pest was reared on each host plant separately in a plastic container. The biological and morphological parameters of the pest were determined in this study to check their suitability on the tested hosts. The biological parameters such as egg, the larval period from 1st instar to last instar, pupal period, and adults (male and female) period were checked, while morphological parameters were also determined. The rearing of the pest was done according to the procedure of early researchers [16].

Results and Discussion

The host preference of *S. litura* was checked on different host plants in this study. The study showed 3.11, 3.18 and 3.15 days as incubation periods on cabbage, alfalfa and okra, respectively. The mean developmental period of 1st, 2nd, 3rd, 4th, 5th, and 6th larval instar on cabbage was 3.30, 3.40, 3.61, 4.33, 6.44, and 5.29 days, respectively, while 4.00, 3.59, 4.69, 4.43, 6.99, and 6.68 days on alfalfa, respectively (Table 1). The total developmental period of 1st-6th larval instar on cabbage, alfalfa and okra was 26.19, 33.74 and 29.38 days, respectively. The maximum larval period was recorded on alfalfa and the minimum on the cabbage. It resulted that among the tested host plants, cabbage was the most suitable host followed by okra and alfalfa. The food consumption rate of the pest was highest on the cabbage as compared to other tested hosts such as alfalfa and okra. The egg hatchability percentage of the pest was recorded as highest on cabbage followed by okra and alfalfa as shown in figure 1. Alfalfa was not a suitable host for pest growth and development.

The adults which emerged from the larvae and pupae reared on alfalfa host were not highly efficient in egg lying and the survival rate of such adults was very low as compared to those which reared or emerged from larvae reared on okra and cabbage. The host can highly affect pest growth and development [10] recorded a 92% egg-hatching percentage on cabbage. Our current study findings are almost similar to the previous studies conducted by researchers [4,17,19].

According to the investigation of [6], the larval period of a pest can vary according to host plants such as 15.50 days on cotton, 14.91 days on maize and 13.10 days on soybean, while [23] recorded 17.33 and 17.03 days on castor and okra, respectively. In the current study, the total pupal period was 2-3 days on cabbage, 2-4 days on okra and 5 days on alfalfa. Many other researchers had recorded 2-3 and 3 days on castor and tapioca leaves, respectively [8]. The length of larvae on okra, alfalfa and cabbage was 3.51, 3.44 and 3.58cm, respectively, while the weight of larvae was 0.50, 0.47 and 0.55g, respectively (Table 2). The mean larval weight and length were recorded maximum on cabbage followed by okra and alfalfa. [19] recorded similar results regarding the weight of larvae in cabbage. The wing expanse and body length of male and female are given in table 3. It is recorded that the consumption per larva was highest in cabbage (5.41g), followed by okra (5.34g), and alfalfa (4.87g). No statistically significant difference was recorded between the leaf consumption by larvae reared on different hosts (Table 4).

Parameters	Cabbage	Alfalfa	Okra
Incubation period	3.11 ± 0.60a	3.18 ± 0.15a	3.15 ± 0.21a
First instar	3.30 ± 0.21a	4.00 ± 0.19b	3.46 ± 0.09b
Second instar	3.40 ± 0.11a	3.59 ± 0.38ab	3.49 ± 0.17b
Third instar	3.61 ± 0.16a	4.69 ± 0.33b	4.63 ± 0.15a
Fourth instar	4.33 ± 0.13a	4.43 ± 0.14b	4.36 ± 0.11a
Fifth instar	6.44 ± 0.21a	6.99 ± 0.29c	6.50 ± 0.13b
Sixth instar	5.29 ± 0.17a	6.68 ± 0.10bc	5.31 ± 0.12b
Total larval period	26.19 ± 0.14a	33.74 ± 0.35c	29.38 ± 0.45b
Pupal period	7.00 ± 0.40a	7.38 ± 0.30b	7.08 ± 0.36c
Male adult	6.47 ± 0.12a	7.87 ± 0.20a	6.69 ± 0.13a
Female adult	6.40 ± 0.14	7.12 ± 0.29c	6.41 ± 0.30ab

Table 1: Biological parameters of *Spodoptera litura* on different hosts.

Host plants	Length of the larva (cm)	Weight of larva (g)
Okra	3.51 ± 0.42ab	0.50 ± 0.10ab
Alfalfa	3.44 ± 0.69ab	0.47 ± 0.07bc
Cabbage	3.58 ± 0.22a	0.55 ± 0.08a

Table 2: Larval length and weight on different hosts.

Parameters	Cabbage	Alfalfa	Okra
Wing expanse of male	35.33 ± 0.74a	32.44 ± 0.69a	35.12 ± 0.70a
Wing expanse of female	36.71 ± 0.84ab	34.55 ± 0.93a	36.11 ± 0.84a
The body length of male	16.44 ± 0.23a	14.76 ± 0.83ab	15.81 ± 0.77ab

Table 3: Wing expanse and body length of male and female.

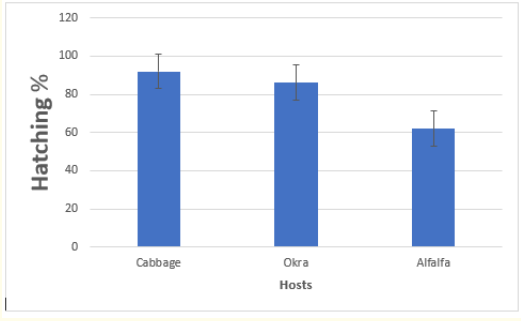

Figure 1: Hatching percentage of eggs on different host plants.

Conclusion

It is concluded that the most preferable host of *Spodoptera litura* which supports growth and development is cabbage followed by okra and alfalfa. The rearing of the pest could be done on this suitable and preferable host. The informations about host plants are very necessary to control or adopt the management approaches for this destructive or dangerous pest.

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