

BIOLOGY OF TOBACCO CATERPILLAR, *SPODOPTERA LITURA* FAB. ON DIFFERENT HOSTS AND ANTIFEEDANT EFFECT OF PLANT PRODUCTS ON IT

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Abstract: *Spodoptera litura* (Fab.) (Lepidoptera: Noctuidae) is polyphagous pest damaging numerous crops in India and many other countries. Moths are found primarily active during night and due to its high mobility, female ovipositing on a wide range of host plants. There have been a number of studies on the biological parameters of *S. litura* on different host plants under different environmental conditions, particularly in India. Artificial diet reared tobacco caterpillar showed higher pupation (89.2%), emergence (97.2%), survival (86.6%) and fecundity (2486.2 eggs) as compared to the most preferred natural food. Out of 24 weed plants tested, high consumption of leaves was recorded on eight species. Dietary concentrations of azadirachtin although significantly lowered the efficiencies of conversion of both ingested (ECI) and digested (ECD) food, it failed to lower the approximate digestibility (AD).

Keywords: Biology, Host, *Spodoptera litura*, Tobacco caterpillar, Weeds

INTRODUCTION

The tobacco caterpillar, *Spodoptera litura* (Fab.) is one of the important polyphagous pests on crops, distributed throughout South and Eastern world, infesting 112 species of plants belonging to 44 families, of which 40 species were reported from India. (Chari and Patel, 1983) Though is a serious pest of tobacco, it also attacks cole crops, castor, cotton, chilies, sunflower, groundnut, pulses, amaranthus and tomato. In the outbreak condition on tobacco, it was reported that not less than 15 egg masses and 400 to 500 larvae were observed as against four egg masses and 200 larvae per plant in normal condition (Yadav *et al.*, 2012)

The *Spodoptera* moths are found primarily active during night and due to its high mobility, female ovipositing on a wide range of host plants, which promotes or even ensures survival of *S. litura* individual over a broad range of environmental conditions (Chelliah, 1985). Among the various abiotic factors minimum temperature, vapour pressure (morning & evening) and RH (evening) were found most influencing factors showed negative effect on oviposition behaviour and larval development of *S. litura*. The maximum temperature showed significant negative influence on oviposition by *S. litura*. (Thanki *et al.* 2003).

Tobacco caterpillar adult is brown in colour. It lays eggs in clusters of 40-200 and covered with brown hairs and a female can lay about 2000 eggs. The eggs hatch in 3-4 days. The caterpillars fully grow within 20-40 days and measures 3-5 cm in length. It is greenish or pale brown in colour with broken dark brown stripes along the body. When it is young it is generally green. Later it turns to dark green or violet. It pupates in the soil within 17-24 days, the adult moth comes out. The total life cycle is completed in

43-63 days. After December, particularly after heavy rains, heavy infestation develops. Larvae are polyphagous and appear on groundnut crop both in vegetative phase and at the time of pod formation. Among the pod borers, *Spodoptera litura* is major and does maximum damage to groundnut crop. The larvae of second and third instar enter groundnut pods by making a hole near calyx and feed on groundnut seed. The affected pods drop off or develop white colour on drying.

Biology on different hosts plants

Khuhro *et al.*, 1986 studied the biology of *Spodoptera litura* Fab. on some of the susceptible plants in relation to their periods of growth. In the first period (summer +) of growth, green gram, cowpea, kidney pea and groundnut crops were examined which showed averagely 20.66, 27.27, 4.74 and 7.67 pests/sq. meter, respectively. During the 2nd period (late summer,) spinach and cauliflower had on an av. population 54.26 and 6.20 cutworms/sq. meter, respectively; while in the 3rd period (winter +), spinach, cauliflower and clover had averagely 12.67, 27.78 and 46.97 pests/sq. meter, respectively. During summer, the cowpea was preferred by the pest and in the late summer and winter it preferred spinach and cauliflower, respectively. The higher pest population developed on clover was due to its prolonged growth. Todd *et al.* 1991 observed in a laboratory feeding bioassay that larval weight (75.7 mg) was more in susceptible variety of groundnut (Southern runner) as compared to resistant genotypes (26.5 mg). Tiwari *et al.* (1991) reported that the groundnut variety C-501 was less suitable food plant to *S. litura*, possibly on account of the texture of leaves *and/or* the presence of a growth regulator.

Sharma 1994, fed the germinating seeds of soybean, gram, wheat, sunflower and linseed to tobacco caterpillar, *Spodoptera litura* Fabricius in the

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laboratory at ambient temperature (15-25 degree centigrade). The host appeared to influence significantly the larval developmental period, its size and weight, the period and number of egg deposited and sex ratio of the progeny. On the basis of these parameters, soybean proved to be the most preferred host. On germinating seeds of soybean, the total developmental period was 32.67 days as compared to 43.72 days on linseed. The feeding capacity of *S. litura* was maximum (162.2mg) on soybean as compared to 117.97 mg on linseed. Linseed was the least preferred while gram and wheat were intermediate in preference.

Kulkarni, 1989 and Patil *et al.*, 1995 were studied the biology of *S. litura* on different ground nut genotypes along with a wild tetraploid, *Arachis manticola* (L.). Survival was least on the wild species, while it was maximum on Dh-3-30.

Xue *et al.*, (2010) reported Effects of four host plants, tobacco, Chinese cabbage, cowpea and sweet potato, on larval and pupal development and survival, and longevity and fecundity of adults of *Spodoptera litura* (F) (Lepidoptera: Noctuidae), were studied under laboratory conditions (26° C, 60-80% RH). *S. litura* females oviposited most on Chinese cabbage, least on tobacco, and intermediate on cowpea and sweet potato. *S. litura* larvae developed differently on the four host plants, from shortest to longest in the following order: Chinese cabbage, cowpea, sweet potato, and tobacco. Pupal development was shorter on cowpea than on the other three host plants, and males generally developed longer than females.

Yadav *et al.*, (2014) studied the biology of tobacco caterpillar (*Spodoptera litura* Fab.) on ten different hosts. On the basis of larval period, larval weight, pupal period, pupal weight, survival per cent, sex ratio, oviposition period, incubation period, fecundity, growth and development index values, the cauliflower host was found as the most preferred host (growth index 8.79, development index 3.22, per cent survival 74.66, larval period 11.00 day, pupal period 10.25 and pupal weight 377.00 Mg) followed by cabbage growth index 5.84, development index 2.6 and survival per cent 71.33. Pea, spinach, tobacco were found least preferred hosts and had retarding effects on the growth and development of tobacco caterpillar (*Spodoptera litura* Fab.) resulting in a prolonged larval period, least survival per cent, minimum larval and pupal weight and growth and development indices.

Gupta *et al.*, 2015 studied that *Spodoptera litura* is an important polyphagous pest in India. It is serious pest of various economically important crops including mango and biology of *Spodoptera litura* was studied in detail on mango during the period of March, 2012 to February, 2013 in Jammu. *Spodoptera litura* underwent the holometabolous type of development and the studies on biology of *S. litura* indicated that on an average female moth laid 200-250 eggs in her life span. The duration of egg, larvae, and pupa

lasted for an average of 5.0±0.00 days, 15.45±1.14 and 9.37±1.37 days. The Adult male and female survived for a period of 7-9 days with an average of 8.32±0.20 days. The total life cycle from egg laying to adult emergence completes in 27-31 days with an average of 28.81±1.99 days. The adult female and male are hairy. The female is pale brown while the male is darker. The female is bigger with a stout abdomen while the male is narrower and tapering towards the tip.

Shakya *et al.*, (2015) observed that the *Spodoptera* eggs were spherical, somewhat flattened, laid in batches and covered with hair scales from the tip of the abdomen of the female moth. Usually pale orange-brown or pink in colour. The incubation period of the eggs under laboratory conditions ranged between 3 to 5 days with an average of 4.2 ± 0.83. The larva passed through six instars before becoming pupa. The duration of the first, second, third, fourth, fifth and sixth instar varied from 3, 3 to 4, 4 to 5, 4 to 5, 7 to 8, and 1 to 2 days with an average of 3.0 ± 0.0, 3.6 ± 0.54, 4.8 ± 0.54, 4.6 ± 0.54, 7.4 ± 0.54 and 1.6 ± 0.54 days, respectively. The total larval period completed in 25-26 days with an average of 25 ± 1.0 days. The tip of the abdomen had two small spines and the pupae were reddish brown in colour. The total pupal period completed in 7 to 9 days with an average of 7.8 ± 1.095 days. Moths were grey-brown in colour. The forewings were grey to reddish-brown with a strongly variegated pattern and paler lines along the veins. The adult female period was 9 days and male period was 5 to 6 days, respectively with an average of 9.0 ± 0.0 and 5.5 ± 0.213. The female fecundity ranged between 235 to 290 eggs/female with an average of 262.5 ± 1.705 eggs/female.

Amin (2016) studied the effects of CB1, CB3, CB5, CB8 and CB12 cotton varieties on the nutritional indices and biological parameters of armyworm *Spodoptera litura* under laboratory conditions. The armyworm larvae showed the highest and lowest food consumption rates on CB8 and CB1 variety, respectively. The efficiency of the conversion of digested food, efficiency of conversion of ingested food, approximate digestibility rates were statistically higher and similar on CB5 and CB8, and lowest on CB1. The larvae reared on CB12 variety exerted the lowest feeding and growth indices, and the relative growth rate was highest on CB8. The survival rates of egg, larva, pupa and adult moths were found highest on CB8 and lowest on CB12. The development durations of the immature stages of the insect differed significantly and the time elapsed from egg-to-adult emergence, longevity of both male and female moths, and their lifecycle were shortest on CB12 variety. The nutritional indices and biological parameters of the armyworm indicated that the varieties CB5 and CB8 were suitable host plants for feeding and development of *S. litura*.

Naik *et al.*, (2017) observed the biology of *S. litura* on vegetable and grain soybean during June to

November (2012) under laboratory. The, egg, larva, prepupa and pupal period was lasted for 3.13, 16.34, 1.30 and 8.48 days respectively, on vegetable soybean. Whereas, the egg, larva, pre pupa and pupal period was completed in 2.84, 14.39, 0.91 and 7.95 days respectively, on grain soybean. Kulkarni (1989) also found more or less same results. The *S. litura* deposited eggs in batches on tender leaves and covered with the abdominal scales, the larvae moulted for five times and completed six instars. Pupation occurred at six to eight cm depth in soil.

Daniel and Samiayyan (2017) reported that the host plants affect all the growth parameters studied in the test insect, *S. litura*. Chickpea, with the highest average consumption index, growth rate and digestibility was found to be the best host plant. Highest consumption and excretion was recorded with castor. The approximate digestibility was the low in the weed plant parthenium. Though the consumption rate was high in castor, efficiency of conversion of digested food was the least, suggesting less nutritious. However, the conversion efficiency of ingested and digested food in chickpea was the least in early instar larva but the highest in late instars. So chickpea can be considered as the best host plant for the successful survival of the pest and it can be selected as the host plant for conducting laboratory experiments with *S. litura*.

Supriya *et al.*, (2018) reported the survival and fertility characteristics of the third instar larvae of *Spodoptera litura* (Fabricius), on Bt-I and Bt-II cotton hybrids during 120-150 DAS were assessed in the laboratory. Life tables and population parameters of the *S. litura* were constructed in an environment with unlimited food supply and that was free of natural enemies. The results revealed that the modest rate of mortality occurred in the immature stage, especially in the third instar. The population parameters calculated are recorded as low in Bt-II hybrids compared to Bt-I hybrids. The net reproductive rate (R0) recorded highest 447.24 on NCS- 954 Bt-I whereas lowest on RCH-134 Bt-II as 169.35.

Effect of Temperature on the biology of *Spodoptera litura*

Sanjrani *et al.*, 1989 carried out the laboratory studies to determine the effect of temperature on the biology of *Spodoptera litura* Fab. The highest and lowest number and fertility of eggs were observed at an average temperature of 19.55 and 34.9°C, respectively. While the shortest duration of life cycle (26.6 days) was also recorded at 34.9°C.

Fand *et al.*, (2015) reported that the temperatures within the evaluation range (15–38°C) had a large impact on the development times of *S. litura* life stages. There were decreases in immature development times from low to high temperatures till 35°C after which development becomes non-linear. Temperature significantly influenced immature survival in *S. litura*. Less than 1.5% survival was

observed for larval and pupal stages at 38°C. Only two larvae survived until pupation at 38°C, however, they died shortly after pupation. At constant temperature of 15°C, the egg and larval survival ranged between 18–23%, whereas only 1.0% of the pupae could survive to become adults at this low temperature. However, the adults emerged were very small, feeble and inactive, and were died within less than 6 h of emergence. The highest survival of eggs (93.0%), larvae (65.0%) and pupae (91.0%) were observed at 20°C, 30°C and 25°C, respectively.

Eggs were produced by females from temperature regimes between 20–30°C only, with the minimum number of total eggs per female at 20°C (492.3) and peak egg laying at 25°C (1234.9) in their gonotrophic cycle. No egg laying occurred at 15°C and 38°C temperatures, indicating that the range of temperatures both the minimum and maximum thresholds for egg production for *S. litura* population. Thakur *et al.*, (2017) reported significant effect of temperature on the biological parameters of *S. litura* and which revealed that development duration of life stages *viz.*, egg, larva, pupa, adult and their total life span decreased with increase in temperature from 18±1 to 33±1 °C. However, favorable temperature range observed was only between 24 to 27 °C for *S. litura* egg hatchability, larvae reaching 4th instar, pupae and adult emergence.

Devi and Jha (2017) reported the duration of the egg stage, larval instars and adult duration variation during development. At 20°C it took longer time to develop than 25 and 30°C. At 20°C, six larval instars were recorded while at 25 and 30°C five larval instars were recorded. First instar larvae showed high C.I., which gradually decreased with larval age. C.I. gradually increased with rise in temperature. A.D. also varied considerably at different stages of development. A.D. for entire larval life decreased with larval age, but at fifth and sixth instar, at all temperature regimes larvae digested more leaves than preceding instar. The E.C.I. and E.C.D. values increased not only with advanced larval instar, but also with rise in temperature.

Karmakar and Pal (2017) concluded that the temperature change has a direct impact on nutritional parameters of *S. litura* on various host plants. The tested temperature (30 °C) was most favourable for the food consumption and utilization of castor, cabbage and tomato by final instar. Based on nutritional requirements of *S. litura*, the three host plants were ranked as castor > cabbage > tomato in suitability.

Biology of *S. litura* on Artificial diets

Ahmed *et al.*, (1979) observed that the duration of larval and pupal periods was shorter (12.2 and 7.7 days respectively). Pre-pupation was selected as the end point of the larval stage since the pre-pupa possesses certain features, such as the exerted head and inactivity that clearly distinguishes it from the earlier stage. Heavier 4th instar larvae and pupae (99

and 390 mg respectively compared with 54 and 358 mg respectively) and enhanced adult eclosion (94.4% compared with 87.3%) were recorded on the modified medium.

An artificial diet for mass rearing of the tobacco caterpillar *Spodoptera litura* (Fabricius) from the neonate to adult stage was developed by Gupta *et al.*, 2005 at 27±1°C, 65±5% RH and 16:8 h scoto/photophase regime. The diet ingredients consisted of wheat germ (26.0 g), kidney bean flour (51.3 g), chickpea flour (56.0 g), yeast powder (31.6 g), casein (15.2 g), l-ascorbic acid (3.2 g), cholesterol (0.5 g), two multivitamin multimineral capsules, one vitamin E capsule, ABDEC drops (2 ml), castor oil (1 ml), methyl-p-hydroxybenzoate (1.8 g), sorbic acid (1.3 g), streptomycin sulphate (0.25 g), formaldehyde solution (2 ml), agar-agar (16.4 g) and 820 ml distilled water. The new artificial diet successfully supported the growth and development for more than ten generations with enhanced reproductive potential. The mean biological parameters based on rearing of ten continuous generations showed higher pupation (89.2%), emergence (97.2%), survival (86.6%) and fecundity (2486.2 eggs) as compared to the most preferred natural food, castor leaf whose respective recorded values are 80, 75, 60% and 480 eggs. The cost of 1 l of the diet was approximately US\$ 2.00 only, on which 200 neonate larvae can be reared.

Chohan *et al.* (2015) maintained the pure culture of tobacco caterpillar (*Spodoptera litura* F.) under laboratory conditions. Artificial diet impregnated with various concentrations of nickel (T1-0, T2-1, T3-5, T4-10, T5-15, T6-20, T7-30, T8-40 mg Ni/kg) were offered continuously to the larvae for three generations. Each treatment was replicated thrice. Treatment T8 (40 mg Ni/kg) recorded lowest fecundity (472.56 eggs/female) and fertility (73.12%). Significantly lowest fecundity (394.58 eggs/female) and fertility (73.32%) was recorded in generation-3. Minimum incubation period (3.0 days) was recorded with treatment T2 (5 mg Ni/kg) whereas, maximum (4.0 days) was recorded in treatment T7 (40 mg Ni/kg). Minimum incubation period (2.96 days) was recorded in generation -1. Maximum larval period was recorded in Treatment T7 (40 mg Ni/kg) whereas, pupal period was maximum at 1 mg Ni/kg. Longest life cycle was recorded at Treatment T7 (40 mg Ni/kg) 33.64 days. Statistically minimum developmental period 29.76 days was observed in generation-1 as compared to generation -2 and generation-3. *Spodoptera litura* F. showed dose dependent relationship with the nickel doses in the artificial diet.

Saljoqi *et al.*, 2015 reared *Spodoptera litura* (Fabricius) on different artificial diets i.e., bean based diet (Diet-1) and gram based diet (Diet-2) and its parasitism with *Trichogramma chilonis* (Ishii) were conducted under controlled laboratory conditions of the 1st, 2nd and 3rd generations of the immature stage of *S. litura* on diet-2 resulted in

highest % survival rates among all the parameters of immature stages of *S. litura*. Highest parasitism rate of 91.1% and 89.5 % was observed in the egg cards exposed to *T. chilonis* for 24 h in Diet-2 and Diet-1, respectively, while after 16 h exposure, 90 and 88.6 % was recorded for Diet-2 and Diet-1, respectively. Diet-2 was found to be better compared with Diet-1 for rearing of *S. litura*.

Biology of *Spodoptera litura* on weed hosts

Kumar and Ray 2007 were studied the development of *Spodoptera litura* on weed hosts. Out of 24 weed plants tested, high consumption of leaves was recorded on eight species. Further studies were conducted on the development of *S. litura* on these highly preferred weeds, namely *Alternanthera philoxeroides* Mart., *Euphorbia hirta* L., *Eichhornia crassipes* Mart., *Trianthema portulacastrum*, *Parthenium hysterophorus* L., *Cichorium intybus* L., *Rumex obtusifolius* L. and *Ipomoea fistulosa* Mart. These were significant difference in the developmental of the insect on different host plants. Among all the weeds, *T. portulacastrum* was found to be the most suitable food plant. Fast development of *S. litura* on many weed hosts indicates the high potential of the insect as a pest in the agrosystem.

Medhini *et al.*, (2012) were studied the impact of leaf and flower extracts of *Calendula officinalis* on total protein and total carbohydrate contents of the hemolymph, midgut and midgut content of *Spodoptera litura* larvae. Among the leaf and flower extracts tested in the hemolymph, the highest reduction in protein content of the larvae was caused by chloroform leaf and benzene flower extracts whereas in the midgut, chloroform leaf and petroleum ether flower extracts reduced the protein to the maximum.

Javar *et al.*, (2013) was evaluated the suitability of *C. asiatica* as a food source for *S. litura* by studying the biology of this pest on excised *C. asiatica* leaves, under laboratory conditions. *S. litura* completed its whole life cycle in 29 to 35 days. The mean pupal weight and the average number of eggs laid by a single female were 0.341 g and 1,930 eggs, respectively. Daily monitoring of the larval development stages as well as analysis on the width of head capsules, revealed the existence of six instars during the larval stages of *S. litura*.

Kumar and Ray 2018 Conducted the experiment to determine the preference and host range of a polyphagous lepidopteron, *Spodoptera litura*. Culture of *S. litura* was maintained on *T. portulacastrum* leaves at 26 ±2 °C and 70 ±5% RH. Forty five plant species of crops and weeds belonging to 21 families were used for host preference study. Out of the 45 crop and weed plants tested, larvae of *S. litura* showed high, moderate, low and nil preference for 15, 12, 7 and 9 plant species, respectively. Among the crop plants, maximum preference was observed on *Lycopersicon esculentum* Mill., *Spinacea oleracea* L., *Brassica*

oleracea L. var. *capitata* and *Trifolium alexandrinum* L. Among the 25 weed plants tested, high feeding preference was observed on *Alternanthera philoxeroides* Mart., *Euphorbia hirta* L., *Eichhornia crassipes* Mart., *Trianthema portulacastrum* L., *Parthenium hysterophorus* L., *Cichorium intybus* L., *Rumex obtusifolius* L., *Chenopodium album* L., and *Ipomoea fistulosa* Mart.

Antifeedant and ovicidal effect of plant products on Biology of *S. litura*.

Mane (1968) studied the efficacy of NSKE as antifeedant against larvae of *S. litura*. Absolute protection to castor leaves was observed at 0.5 per cent against *Euproctis lunata* (Walker). Whereas, in the case of *S. litura*, 70.2 per cent protection to treated leaves was observed. Sayed (1983) observed the effect of various concentrations of suspensions of ground seeds of neem on egg and larvae of *S. littoralis* in the laboratory. The treatment to first or fifth instar larvae at 0.2 to 0.5 per cent caused cent per cent mortality by the end of larval stage. Larval treatment also resulted in pupal mortality and adult deformity. When the eggs were dipped in 2 per cent suspension, 90 per cent of them failed to hatch.

Koshiya and Ghelani (1990) were carried out an investigation to determine the antifeedant activity of different plant extracts against the third instar larvae of *S. litura* on groundnut leaves. The results indicated that leaf and seed extracts of neem and the seed extract of karanja at 1.5% concentration were highly detrimental and offered 78.55, 88.96 and 66.41 per cent protection, respectively, provided by extracts of *A. squamosa*, *Adhatoda vasica* Nees., *Datura suave/ens* was 26.51, 6.98 and 16.35 per cent, respectively.

Mukherjee and Sharma (1996) reported final (sixth) instar larvae of *Spodoptera litura* were fed in increasing amounts of azadirachtin and the effects on feeding activity, dietary utilization and mid-gut carboxylesterase activity were determined. The antifeedant activity of azadirachtin did not increase in a dose-dependent manner as reflected by the decline in antifeedant effect at higher doses of 30 and 50 ppm. Dietary concentrations of azadirachtin although significantly lowered the efficiencies of conversion of both ingested (ECI) and digested (ECD) food, it failed to lower the approximate digestibility (AD). Feeding of higher doses (30 and 50 ppm) resulted in significant increase in midgut carboxylesterase activity. Thus insensitivity to antifeedant effects and induction of midgut carboxylesterase activity in the older leaves of *S. litura* in response to high doses of Azadirachtin observed.

Sahayaraj (1998) reported the deterrent effect of *A. indica*, *C. sinensis*, *V. negundo* and *Z. officinalis* was noticed against last instars of *S. litura* in ground nut. Highest general deterrent action was found in *V. negundo*. It was reflected from the very low food consumption, approximate digestibility, less faecal pellets production and reduction in body weight.

Sasikumar *et al*, (2011) evaluated the bioefficacy of leaf and root extracts of *Aristolochia tagala* Cham. at different concentrations was evaluated at room temperature against *Spodoptera litura* Fab. Effects on feeding, larvicidal and pupicidal activities and larval–pupal duration were studied. Higher antifeedant activity (56.06%), lethal concentration for feeding inhibition (3.69%), larvicidal (40.66%), pupicidal (28%), total mortality (68.66%) and prolonged larval–pupal duration (12.04–13.08 days) were observed in ethyl acetate leaf extract at 5.0% concentration. Dose dependant effect of test extracts was observed. This plant could be used to isolate active principles and to develop a new botanical formulation in pest management programmes.

Packiam and Ignacimuthu (2012) reported the antifeedant and growth regulating activities of *PONNEEM*, an oil formulation containing neem and pungam (karanj) oils along with individual neem and karanj oils and Nimbicidine, a commercial neem-based pesticide against fourth instar larvae of *Spodoptera litura* (Fab.). Among all the treatments, *PONNEEM* recorded the maximum antifeedant activity (88.6%) at 0.6%. Neem and karanj individual treatments as well as *PONNEEM* extended larval duration compared to control. Pupal weight and fecundity were significantly reduced and pupal period was greatly increased by *PONNEEM* treatment compared to other treatments. The *PONNEEM* was found to be compatible with *Trichogramma chilonis* Ishii, an egg parasitoid of many lepidopteran pests, at 0.15, 0.3 and 0.5% concentrations. *PONNEEM* did not affect the parasitoid emergence significantly at 0.3% concentration compared to control. *PONNEEM* also showed growth disruption activity against fourth instar larvae. Bakavathiappan *et al*, (2012) was carried out studies to determine the antifeedant activity of different solvent extracts (0.625, 1.25, 2.5 and 5%) of *Calotropis procera* leaves against third instar larvae of *Spodoptera litura* by leaf dip method. The maximum activity was recorded in chloroform extract followed by hexane, ethanol, acetone, ethyl acetate and methanol. Chloroform extract exhibited the best larvicidal activity against the *S. litura*. The antifeedant activity was directly proportional to the concentration of the extract. Arivoli and Tennyson (2013) observed the ovicidal activity of plant extracts to control the pest at egg stage itself thereby preventing the damage caused by other stages. In the present study, the ovicidal effect of twenty five plants screened against *Spodoptera litura* at 0.1% concentration. Amongst the twenty five plants tested, *Cleistanthus collinus* hexane (85.16%), *Murraya koeingii* diethyl ether (83.60%), *Aegle marmelos* ethyl acetate (76.14%) and hexane extracts of *Strychnos nuxvomica* (61.00%) and *Vitex negundo* (52.02%) showed maximum ovicidal activity against *Spodoptera litura* at concentration of 0.05%.

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