Effect of certain host plants on food consumption and utilization of cotton leafworm, *Spodoptera littoralis* (Boisd.)

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ABSTRACT

The present studies aim to evaluate the digestibility indices of *Spodoptra littoralis* on certain host plants under laboratory conditions. The data on digestibility indices of *S. littoralis* on different hosts revealed that, consumption rate (CR) was highest on common bean (0.50 mg/mg/day) and lowest on corn (0.30 mg/mg/day) in 3rd instar larvae at first generation. Consumption rate were found to be maximum in second generation on lettuce in 3rd, 4th and 6th instar larvae (0.51, 0.32 and 0.24 mg/mg/day), respectively. While the highest CR were reported in 4th, 5th and 6th instar larvae (0.32, 0.32 and 0.24 mg/mg/day) at third generation. The highest value of growth rate (GR) was recorded by larvae of *S. littoralis* fed on lettuce followed by tomato in different instars for three generations but the highest GR was observed with larvae of *S. littoralis* fed on common bean in 3rd instars at first and second generations. Approximate digestibility (AD) was observed at the highest mean value through the larvae fed on lettuce leaves during third generation. The data revealed that, the highest Assimilation rate (AR) were reported in 3rd instar larvae fed on common bean (44.96%) at first generation and (39.94%) at second generation. ECD and ECI were in the highest level at 6th instar during three generations when larvae reared on leaves of common bean. Data explained that, (CR, GR, AD, AR, ECI and ECD) were significantly affected by host plants, instars and generations.

Keywords: Spodoptera littoralis; tomato leaves; lettuce leaves; common bean leaves.

INTRODUCTION

The cotton leafworm, *S. littoralis* (Boisd.) has been considered as dangerous economic pest of cotton and several vegetable and field crops all over the year in Egypt (Dahi and Hamoda 2008). Although the degree of field infestations of the Egyptian cotton leafworm, *S. littoralis*, was diminished lately, it is remain one of the most dangerous pests of cotton not only growing in Egypt but also in other countries (Horowitz *et al*. 1994). Cotton leafworm can attacks around 112 spECIes from 44 different families of agricultural crops (Moussa *et al*. 1960). Physiological differences between herbivores is generally simple and it is the first stage to study host use differential (Pashley *et al.* 1995). Differences in development is usually occur even when a population is kept in constant condition and variation that happens reliess on temperature and introduced food (El Saadany and Hamed, 1991). Host plants change plays an important role in insect pests increase and spread (Singh and Parihar. 1988; Lu and Xu. 1998). Efficiency of food utilization is back to quantity and quality of consumed food (Naseri *et al.* 2010) which affect insect reproduction, survivorship, parameters of life table and development (Kim and Lee. 2002; Tsai and Wang. 2001; Scriber and Slansky. 1981). The consumption food is essential for insect development, reproduction and growth, and the mount and the extent of supplement in the elements of the larval eating influence food acceptance, besides influencing adult performance of adults (Panizzi and Parra 2009). Study indices of nutritional helps to understanding physiological behavior for insects and its relationship with host plants (Lazarevic and Mataruga, 2003). Finding an effective method for controlling severe damages to agricultural crops in Egypt by *S. littoralis* is an urgent and necessary request (Ahmed and El-Katatny, 2007). So, the main goal of this research is focus on study the effect of changing host plants on food consumption and utilization for the cotton leafworm.

MATERIALS AND METHODS

Insect rearing:

The strain of larvae used in the present study was obtained from the Plant Protection Research Institute. These larvae were reared in insect breeding lab in Department of Plant Protection, Faculty of Agricultural, Al-Azhar University, Cairo. Larvae were fed on fresh Castor oil leaves until pupation at constant temperature of 25±1ºC and relative humidity of 65±5%.

Host plants:

Five plant species belonging to five different botanical families were used in the present study, as shown in Table (1). These plants were planted in the farm of faculty of Agricultural, Al-Azhar University, Cairo without using any pesticides, for the evaluating consumption and utilization by cotton leafworm, *S. littoralis* larvae. Before introducing the plant leaves they were washed for 10 mints. In running tap water and air dried by an electric fan.

Food consumption and utilization

Every 10 larvae were placed in a (Plastic cage) covered with a mesh net for ventilation with one mature and fresh leaf of the previously mentioned host plants. Five replicates were used for each host plant. As a contrast, fresh leaves of each treatment were kept in clean jars without larvae, under the same conditions, to determine the natural loss of moisture, which was used for calculating the corrected weight of the consumed leaves. From 3rd to 6th instars larvae were used to determine food consumption and utilization indices of *S. littoralis* on each host plant as they were easier to measure than the primary instars, it were weighed every 24 h, feces were weighed and removed from the leaves and the remaining leaves weighed again. The jars were cleaned and the newly weighed leaves were given to the larvae. The amount of food consumed by each larval instar was determined by subtracting the weight of food introduced from the weight of the left-over food. The weight of digested food was the difference between the amount of food consumed and feces produced during each instar.

The efficiency of food utilization was measured as the amount of food consumed or digested in relation to the increase in body weight. This process was contained every day for each replicate until feeding ceased in prepupa.

The methodology proposed by Waldbauer (1968), the following parameters was used (in fresh matter weight):

$CR = \frac{E}{T \times A}$ A- Mean fresh weight of the larvae during the feeding period.

$GR = \frac{P}{T \times A}$ E- Fresh weight of leaf consumed

$AD\ (\%) = \left(\frac{E-F}{E}\right) \times 100$ T- Duration of feeding period

$AR = CR \times AD$ P- Fresh weight gain of the larvae

$ECD\ (\%) = \left(\frac{P}{E-F}\right) \times 100$ F- Fresh feces weight during the feeding period

$$ECI\ (\%) = \left(\frac{P}{E}\right) \times 100$$

Statistical analysis:

Data were subjected to MANOVA by using "Costat" program (1988) and significant difference among the tested factors portioned by F test at probability level of P = 0.05.

RESULTS AND DISCUSSION

Consumption rate (CR) (mg/mg/day):

Data in table (2) shows the values of consumption rate (CR) by the larval instars of cotton leafworm *S. littorals* during three generations after feeding on fresh leaves of different host plants (Castor oil, Tomato, Lettuce, Corn, and Common bean). The results explained that the consumption rate by the larvae of cotton leafworm was significantly affected by host plants, instars, and generations. Data in table (2) explained that the highest value for CR in 4th and 6th instars were recorded by larvae fed on lettuce during three generations (0.35 and 0.23) in first generation, (0.32 and 0.24) in second generation and (0.48 and 0.24) in third generation, also the lowest value of CR at 4th and 6th instars were recorded on common bean leaves (0.20 and 0.13) in first generation. The same in second generation were (0.29 and 0.15) and third generation (0.23 and 0.17) respectively. Data in Fig. (1) showed that, CR was at highest level when larvae reared on tomato leaves at third generation (0.43 %) and CR was at lowest level with larvae reared on corn leaves at the same generation (0.25%) compared with larvae fed on castor oil leaves (0.33 %).

The results in table (2). and Fig. (1). showed that the consumption rate was on the highest values when larvae fed on tomato and lettuce and the lowest value when fed on common bean and corn compared with larvae fed on castor oil leaves.

Gacemi *et al.*, (2019) studied effect of (cabbage, potato, artichoke, and tomato) on nutritional parameters for cotton leafworm *S. littoralis* and showed that significant differences were found among nutritional parameters of *S. littoralis* on mentioned host

plants. Higher CR observed when larvae fed on cabbage.

Growth rate (GR) (mg/mg/day)**:**

Data in table (3) shows the values of (GR) for the larvae of *S. littoralis* during three generations after feeding on fresh leaves of different host plants (Castor oil, Tomato, Lettuce, Corn and Common bean).

The results explained that the growth rate by the larvae of cotton leafworm was significantly affected by host plants, instars and generations.

Data in table (3) reported that the highest value of GR in 5th instar was recorded when larvae fed on lettuce during three generations (0.15, 0.14 and 0.11) respectively compared with larvae fed on castor oil leaves at the same instar (0.10, 0.09 and o.07) respectively.

Observation the mean value of GR presented in Fig (2) revealed that the highest on the larvae fed on lettuce leaves (0.17%) at second generation followed by larvae fed on tomato and Castor oil leaves (0.16 and 0.15%) at the same generation. The lowest values of GR were recorded in larvae fed on common bean leaves (0.07%) at first generation.

Adel *et al*., (2022) showed that different host of plants affected the GR and AD for larvae during larval instars. Highest GR of *S. frugiperda* was obtained when larvae fed on lettuce leaves and maize leaves (0.60 and 0.59 mg/mg/day), and GR was at lowest level; when larvae reared on broad bean leaves (0.30 mg/mg/day).

Gacemi *et al.* (2019) showed that the highest value of GR was observed on cabbage and artichoke, respectively. They concluded that feeding period affects the rate of growth (GR) values which explain if a host is acceptable and suitable for larvae feeding or not.

Approximate digestibility (AD):

Data in table (4). showed the values of (AD) by the larval instars of cotton leafworm *S. littoralis* during three generations after feeding on fresh leaves of different host plants (Castor oil, Tomato, Lettuce, Corn and Common bean).

The results in table (4) cleared that the approximate digestibility by the larvae of cotton leafworm was significantly affected by instars and generations and not significantly by host plants. The results mentioned that the larvae in 4th instars feed on common bean leaves recorded the lowest value of AD during three generations (67.06, 71.57 and 71.17) respectively compared with larvae fed on remained host plants at the same instar.

Figure (3) explains mean of AD values, it was higher for larvae fed on lettuce leaves in third generation (74.46%) followed by larvae fed on common bean (70.89%) at the same generation. The lowest AD was observed with larvae fed on corn and tomato leaves at third generation compared with larvae fed on Castor oil leaves (71.01%).

Gacemi *et al.* (2019) investigated the effects of different vegetable host plants, potato, tomato, cabbage and artichoke on nutritional parameters of *S. littoralis* under laboratory experiments (25 °C and 65 RH). They showed that 4th instar larvae fed on tomato leaves showed highest (AD) (90. 406 ± 1.125%). Adel *et al*., (2022) showed that different host plants significantly affected the rate of growth and (AD) of larval instars. Highest AD of *S. frugiperda* larvae were recorded by larvae fed on broad bean leaves (88.10%), followed by larvae fed on clover (82.86%), respectively, AD was at lowest percentage of AD by larvae reared on maize leaves (66.38%).

Assimilation rate (AR)

Data in table (5) shows the values of Assimilation rate (AR) by the larval instars of cotton leafworm *S. littoralis* during three generations after feeding on fresh leaves of different host plants (Castor oil, Tomato, Lettuce, Corn and Common bean).

The results explained that the Assimilation rate by the larvae of cotton leafworm was significantly affected by host plants, instars and generations. From data in table (5) the highest value of AR was occurred when larvae reared on tomato leaves at 3rd instar during third generation (84.52%) and the lowest value at the same instar was recorded at the larvae fed on corn leaves (20.26%) compared with larvae fed on Castor oil leaves (33.75%).

The data in Fig.(4) indicated that AR was at highest value in larvae reared on tomato leaves (35.24 %) at third generation followed by larvae fed on lettuce (25.57 %) at the same generation. The lowest AR recorded with larvae fed on corn leaves (17.47 %) compared with larvae fed on castor oil leaves.

The results in table (5) and Fig. (4). showed that the Assimilation rate was on the highest values when larvae fed on tomato and lettuce and the lowest value when fed on common bean and corn.

Mohamed (2004) reared *S. littoralis* larvae on certain host plants and reported that the rate of food assimilation significantly declined through the 5th instar larvae as an effect of different host plants as compared with Castor oil leaves except lettuce leaves.

Efficiency of conversion of ingested food to body tissue (ECI):

Data in table (6) shows the (ECI) by the larval instars of cotton leafworm *S. littoralis* during three generations after feeding on fresh leaves of different host plants (Castor oil, Tomato, Lettuce, Corn and Common bean).

The results explained that the ECI by the larvae of cotton leafworm was significantly affected by host plants, instars and generations. ECI was recorded the highest level at 5th instar when larvae fed on common bean leaves during first generation (66.18%) followed by the larvae fed on tomato and lettuce (62.41 and 56.57%) respectively while lowest level was recorded by larvae reared on corn leaves at the same instar (34.90%) compared with larvae fed on castor oil leaves (65.23%).

From Fig. (5) observed that ECI was deceased from first generation to third generation in all larvae fed on different host plants leaves. The highest ECI recorded in larvae reared on lettuce leaves (47.52%) then the larvae reared on common bean leaves (44.23%), larvae fed on tomato leaves (41.57%) in first generation. The lowest value of ECI was on lettuce leaves (21.20%) in third generation.

Gacemi *et al*., (2019) explained that change host plants had significant differences on nutritional parameters of *S. littoralis*. The 3rd instars fed on tomato leaves recorded the highest ECD and ECI compared with that fed on remain host plants. ECD recorded the highest value by the larvae reared on cabbage. There were significant differences among nutritional parameters of the 4th instars of *S. littoralis* on four host plants. ECI and ECD were at highest level when larvae fed on potato leaves and tomato leaves, respectively.

Efficiency of conversion of digested food to body tissue (ECD)

Data in table (7) shows the (ECD) by cotton leafworm larvae *S. littoralis* during three generations after feeding on fresh leaves of different host plants (Castor oil, Tomato, Lettuce, Corn and Common bean).

The data explained that the ECD by the larvae of cotton leafworm was significantly affected by host plants, instars and generations. Data mentioned in table (7) cleared that the highest ECD for cotton leafworm at 6th instar larvae were recorded on common bean leaves during three generations (50.03, 52.73 and 52.55%) compared with larvae fed on Castor oil leaves (37.51, 36.99 and 35.00%), respectively.

Data in Fig. (6). Showed that, the highest values of ECD in larvae fed on lettuce were recorded at first generation (50.65%). ECD was recorded the lowest value in larvae reared on lettuce in third generation. The ECD values in larvae fed common bean leaves not differ in three generations. ECD values were deceased from first generation to third generation in all larvae fed on different host leaves.

Mohamed (2004) studied food intake rate, the percent digestibility, ECI and ECD for larvae during the 5th and 6th instars larvae of *S. littoralis* fed on five host plants belong to different families. He mentioned that significant differences were found in (AD) values for larvae reared on cotton and other host plants. ECI and ECD were at lowest value at 5th and 6th larval instars reared on lettuce leaves, and the highest values were reported in larvae fed on Castor oil leaves.

CONCLUSION

Digestibility indices (CR, GR, AD, AR, ECI and ECD) by the larvae of *S. littoralis* were studied after reared larvae on fresh leaves of different host plants (Castor oil, Tomato, Lettuce, corn and Common bean) during three generations. The results explained that they were significantly affected by host plants, instars and generations. CR and GR were at highest level when larvae reared on tomato and lettuce leaves while the highest AD was recorded by larvae reared on common bean leaves and lettuce. AR reached to the highest value on tomato leaves compared with the remained host plants. ECI and ECD recorded the highest values by the larvae reared on fresh leaves of common bean compared with larvae reared on fresh castor oil leaves.

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Table 1 the plant species used their leaves in the experiments.

Common name	Family	SCRentific name
Castor oil	Euphorbiaceae	*RiCRnus communis* (L.)
Tomato	Solanaceae	*Solanum lycopersicum* (L.)
Common bean	Fabaceae	*Phaseolus vulgaris* (L.)
Corn	Poaceae	*Zea mays* (L.)
Lettuce	Asteraceae	*Lactuca sativa* (L.)

Table 2: Consumption rate (CR) (mg/mg/day) of *S. littoralis* larvae fed on different host plants during three generations.

Host plant leaves	First generation				Second generation				Third generation			
	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae
Castor oil	0.42	0.30	0.29	0.18	0.23	0.30	0.30	0.23	0.44	0.32	0.32	0.22
Tomato	0.49	0.32	0.32	0.22	0.48	0.32	0.32	0.23	0.91	0.31	0.31	0.18
Lettuce	0.39	0.35	0.29	0.23	0.51	0.32	0.31	0.24	0.48	0.32	0.32	0.24
Corn	0.30	0.24	0.27	0.23	0.33	0.31	0.24	0.21	0.26	0.24	0.28	0.23
Common bean	0.50	0.20	0.20	0.13	0.48	0.29	0.24	0.15	0.37	0.23	0.28	0.17

*CR=E / [(T) x (A)] measures the amount of food eaten per unit time relative to mean weight of larvae during the feeding period E - fresh weight of leaf consumed, T - duration of feeding period and A – mean fresh weight of the larvae during the feeding period.

Main Effects	F Value	P Value	Interaction	F Value	P Value
Generation	17.99	.0000 ***	Generation * Instar	12.16	.0000 ***
Instar	533.39	.0000 ***	Generation * Crops	13.39	.0000 ***
Crops	88.62	.0000 ***	Instar * Crops	42.54	.0000 ***
			Generation*Instar*Crop	21.68	.0000 ***

Table 3: Growth rate GR (mg/mg/day) of the larval instars of *S. littoralis* after feeding on different host plants during three generations.

Host plant leaves	First generation				Second generation				Third generation			
	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae
Castor oil	0.09	0.10	0.12	0.04	0.07	0.09	0.11	0.32	0.11	0.07	0.11	0.05
Tomato	0.08	0.09	0.12	0.06	0.10	0.11	0.12	0.31	0.06	0.11	0.12	0.05
Lettuce	0.10	0.15	0.10	0.06	0.09	0.14	0.11	0.33	0.12	0.11	0.05	0.03
Corn	0.09	0.07	0.09	0.06	0.07	0.11	0.06	0.05	0.07	0.09	0.07	0.05
Common bean	0.12	0.05	0.08	0.04	0.10	0.10	0.08	0.05	0.07	0.08	0.1	0.06

*GR= P/ [(T) x (A)] measures the amount of weight gained per unit time relative to the mean weight of the larvae during the feeding period P - fresh weight gain of the larvae, T - duration of feeding period and A – mean fresh weight of the larvae during the feeding period.

Main Effects	F Value	P Value	Interaction	F Value	P Value
Generation	16.17	.0000 ***	Generation * Instar	13.64	.0000 ***
Instar	347.13	.0000 ***	Generation * Crops	10.21	.0000 ***
Crops	54.38	.0000 ***	Instar * Crops	28.97	.0000 ***
			Generation*Instar*Crop	14.59	.0000 ***

Table 4: Approximate digestibility (AD %) of the larval instars of *S. littoralis* after feeding on different host plants during three generations.

Host plant leaves	First generation				Second generation				Third generation			
	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae
Castor oil	84.13	69.92	62.89	59.99	82.65	68.20	64.77	67.67	76.69	73.81	67.69	65.85
Tomato	84.07	70.4	59.93	57.45	82.75	77.09	67.19	63.87	78.73	73.62	62.47	62.58
Lettuce	68.22	69.03	63.27	61.83	75.97	75.02	70.99	61.98	77.51	80.85	70.97	68.52
Corn	85.95	68.6	61.56	67.27	84.87	73.56	62.22	62.12	78.73	73.62	62.47	62.58
Common bean	89.18	67.06	63.87	60.82	83.10	71.57	63.03	65.98	83.32	71.17	62.96	66.11

*AD= [(E-F)/E] x 100 measures the larvae's ability to digest the introduced food E - fresh weight of leaf consumed and F - fresh feces weight during the feeding period.

Main Effects	F Value	P Value	Interaction	F Value	P Value
Generation	19.94	.0000 ***	Generation * Instar	3.71	.0015 **
Instar	255.66	.0000 ***	Generation * Crops	7.76	.0000 ***
Crops	1.42	.2265 ns	Instar * Crops	10.9	.0000 ***
			Generation*Instar*Crop	2.27	.0009 ***

Table 5: Asumilation rate (AR %) of the larval instars of *S. littoralis* after feeding on different host plants during three generations.

Host plant leaves	First generation				Second generation				Third generation			
	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae
Castor oil	35.47	20.69	17.94	11.05	18.87	20.41	19.55	15.74	33.75	23.82	21.49	14.3
Tomato	40.81	22.34	18.95	12.76	38.47	23.71	21.75	15.08	84.52	23.94	20.56	11.93
Lettuce	26.38	24.28	18.29	14.16	38.47	23.71	21.75	15.08	37.06	25.73	22.74	16.73
Corn	25.96	16.23	16.69	15.68	27.89	22.89	14.81	13.33	20.26	17.95	17.55	14.1
Common bean	44.96	13.64	12.62	8.08	39.94	20.89	15.22	10.01	30.86	16.08	17.82	11.47

*__AR__ = CR x AD CI - Consumption index and AD - Approximate digestibility

Main Effects	F Value	P Value	Interaction	F Value	P Value
Generation	22.77	.0000 ***	Generation * Instar	8.02	.0000 ***
Instar	516.41	.0000 ***	Generation * Crops	14.39	.0000 ***
Crops	58.47	.0000 ***	Instar * Crops	35.99	.0000 ***
			Generation*Instar*Crop	18.46	.0000 ***

Table 6: Efficiency of conversion of ingested food (ECI %) of the larval instars of *S. littoralis* after feeding on different host plants during three generations.

Host plant leaves	First generation				Second generation				Third generation			
	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae
Castor oil	20.37	48.3	65.23	37.51	28.41	30.32	36.83	25.03	24.64	22.05	33.36	23.05
Tomato	16.38	40.92	62.41	46.58	20.63	33.78	36.29	28.59	9.71	33.22	37.36	28.3
Lettuce	26.85	61.34	56.57	45.31	17.66	44.01	36.21	25.5	24.45	33.9	15.9	10.53
Corn	29	27.53	34.9	23.93	20.83	36.02	24.01	21.83	28.16	35.89	23.69	21.8
Common bean	23.05	37.64	66.18	50.03	21.2	33.9	34.05	34.8	19.41	34.51	34.08	34.74

*ECI= (P/E) x 100 is an overall measure of the larvae's ability to utilize ingested food for growth P - fresh weight gain of the larvae and E - fresh weight of leaf consumed by the larvae

Main Effects	F Value	P Value	Interaction	F Value	P Value
Generation	14.05	.0000 ***	Generation * Instar	7.49	.0000 ***
Instar	119.03	.0000 ***	Generation * Crops	7.00	.0000 ***
Crops	5.46	.0003 ***	Instar * Crops	19.44	.0000 ***
			Generation*Instar*Crop	4.81	.0000 ***

Table 7: Efficiency of conversion of digested food (ECD %) of the larval instars of *S. littoralis* after feeding on different host plants during three generations.

Host plant leaves	First generation				Second generation				Third generation			
	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae	3rd instar larvae	4th instar larvae	5th instar larvae	6th instar larvae
Castor oil	24.21	48.3	65.23	37.51	34.37	44.46	56.86	36.99	32.13	29.88	49.28	35.oo
Tomato	19.49	40.92	62.41	46.58	24.93	43.82	54.02	44.77	10.66	44.89	56.26	43.81
Lettuce	39.36	61.34	56.57	45.31	23.24	58.66	51.01	41.15	31.55	41.93	22.4	15.37
Corn	33.74	40.13	56.69	35.57	24.54	48.96	38.59	35.14	35.77	48.75	37.92	34.83
Common bean	25.84	37.64	66.18	50.03	25.52	47.37	54.03	52.73	23.29	48.49	54.14	52.55

*ECD= [P/ (E-F)] x 100 is an overall measure of the larvae's ability to utilize digested food for growth.,P - fresh weight gain of the larvae, E - fresh weight of leaf consumed and F - fresh feces weight during the feeding period.

Main Effects	F Value	P Value	Interaction	F Value	P Value
Generation	14.12	.0000 ***	Generation * Instar	4.00	.0012 **
Instar	0.37	.0000 ***	Generation * Crops	5.33	.0000 ***
Crops	5.94	.0001 ***	Instar * Crops	10.87	.0000 ***
			Generation*Instar*Crop	2.09	.0028 **

تأثير بعض العوائل النباتية على معدل استهلاك الغذاء والإستفادة منه لدودة ورق القطن

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الملخص العربي

الهدف من هذه الدراسة هو تقييم مؤشرات الهضم ليرقات دودة ورق القطن على عوائل نباتية مختلفة تحت الظروف المعمليه. أظهرت النتائج أن معدل استهلاك الغذاء (CR) كان في أعلى قيمة له عندما تغذت اليرقات على أوراق الفاصوليا (0.50%) وأدنى قيمة له على أوراق الذره (0.30%) في العمر اليرقي الثالث خلال الجيل الأول. ووجد أن معدل استهلاك الغذاء كان في أعلى قيمة في الجيل الثاني علي الخس في العمر اليرقي الثالث والرابع والسادس (0.51، 0.32 و 0.24%) علي التوالي بينما في الجيل الثالث كانت أعلى قيمة معدل استهلاك الغذاء في العمر اليرقي الرابع والخامس والسادس (0.32، 0.32 و 0.24%) على التوالي. تم تسجيل أعلى قيمة لمعدل النمو (GR) لليرقات التي تغذت على أوراق الخس تليها الطماطم في مختلف الأعمار لمدة ثلاثة أجيال, ولكن أعلى معدل نمو لوحظ مع اليرقات التي تغذت على الفاصوليا في العمر اليرقي الثالث للجيل الأول والثانى. معدل الهضم التقريبي (AD) لوحظ في أعلي معدل له من خلال اليرقات التي تغذت علي أوراق الخس خلال الجيل الثالث. أوضحت البيانات أن أعلى معدل تمثيل للغذاء (AR) تم تسجيله في العمر اليرقي الثالث على اليرقات التي تغذت على أوراق الفاصوليا (44.96%) في الجيل الأول و (39.94%) في الجيل الثاني. تم تسجيل أعلى قيمة لكفاءة تحويل الغذاء المبتلع (ECI) والمهضوم (ECD) ليرقات دودة ورق القطن في العمر اليرقي السادس لليرقات التي تغذت على أوراق الفاصوليا خلال الثلاثة أجيال. أوضحت النتائج أن مؤشرات الهضم (دليل استهلاك الغذاء، معدل النمو، معدل الهضم التقريبى، معدل التمثيل الغذائى، كفاءة تحويل الغذاء المبتلع، المهضوم) قد تأثرت بشكل كبير بالعوائل النباتية والأعمار اليرقية والأجيال.

الكلمات الاسترشادية : دودة ورق القطن، أوراق الطماطم، أوراق الخس، أوراق الفاصوليا.