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HOST PREFERENCE OF THE ANTHOCORID PREDATOR, *BLAPTOSTETHUS PALLESCENS* POPPIUS (ANTHOCORIDAE: HEMIPTERA) ON CERTAIN MAIZE LEPIDOPTEROUS LARVAE

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ABSTRACT: *The present study was conducted in 2012 year and carried out in the experimental laboratory of Plant Protection Department, Faculty of Agriculture, Fayoum University under the laboratory conditions of 27 ± 1°C and 57.7 ± 5 % R.H. The anthocorid predator, Blaptostethus pallescens Poppius was reared on larvae of each of Pyroderces simplex Wlsm., Cryptoblabes gnidiella Mill., Gymnoscelis pumilatta Hb. and Sesamia cretica Led. This predator was perefered larvae of P. simplex then G. pumilatta larvae then C. gnidiella, while the larvae of S. cretica appeared as unsuitable host.*

Key words: *Maize, Biological studies, Pyroderces simplex , Blaptostethus pallescens , Cryptoblabes gnidiella, and Sesamia cretica.*

INTRODUCTION

Maize (*Zea mays* L.) is an important grain crops in Egypt, where it conforms to wheat in the economic importance. Such crop is cultivated in multiplantations thorough out along a period extending from March to October and attacked with several insect pests (Metwally, 1967 ; Mostafa, 1981; Mostafa and Kirollos 1986 and Davis and Pedigo, 1991).

Although conventional pesticides application has been effective for the majority of the pests, many of these toxic chemicals are expensive and may be persistent in the environment. Therefore, it was necessary to apply biological pest management by using natural enemies that have been registered to be ecologically safe and risk free (Fayad*et al*., 1984; El- Sherif, *et al*., 1987 ; Abd-Ella, 1990; Abd-Elgayed, 1995;Ballal *et al.,* 2003andSobhy *et al*., 2014).

However, studies on natural enemies associated with maize insect pest in Egypt are still in lack. Therefore, the present experiment was concerned to study host preference of the anthocorid predator, *B. pallescens* on some maize insect pests under the optimum laboratory condition. On the other hand, Ballal, *et al.,*2003 reared this predator on *Corcyra cephalonica* Stainton, *Ropalosi phummaidis* Fitch, *Thrips tabaci* and mites for studying biology, feeding potential and rearing techniques.

As far as the authors are aware, few records are available in the literatures concerning biology of the anthocorid predator, *B. pallescens.* Abd-Elgayed (1995) recorded this predator and its host, *P. simplex* on maize, he found the optimum conditions for rearing this predator on larvae of *P. simplex* were 27±1°C and 57.7± 5 % R.H.The longest periods of oviposition (19.2 days) and adult longevity (25.3 days for female) were correlated with the highest counts of egg deposition / female(134.3eggs) and rate of deposition /♀/ day (7.02 eggs).

MATERIALS AND METHODS

To study the host preference of the anthocorid predator, *B. pallescens* on some lepidopterous larvae for maize insect pests, its biological aspects were conducted under the optimum laboratory conditions of27±1°C and 57.7± 5 % R.H. (Abd-Elgayed (1995)in Plant Protection Department, Fac. of Agric., Fayoum Univ. The relative humidity was maintained by using saturated solution of sodium bromide hydrated (Soliman, 1940).

1. Stock culture:

1.1-Hosts:

The biological aspects were experimented on four species of lepidopterous larvae as shown in Table (1).

Mature larvae of each species were collected from the infested young plants (for *S. cretica*) or ears by using a fine hair brush. Such species were introduced in plastic cages of 15x10x8 cm, provided with small pieces of young corn ear. Such cages were observed daily until the adult emergence. Pairs of newly moths (each one male & one female) were confined in chimney glasses (9 cm diameter & 14 cm height) covered with muslin. Each cage was provided with small pieces of maize ear (as an oviposition site) and wetted cotton piece for providing humidity and adult nourishment. These cages were inspected daily for renewing the pieces of maize ears and transferred into Petri dishes (10cm) as needed until pupation (Abd-Elgayed, 1995).

1.2- The anthocorid predator, *Blaptostethus pallescens:*

To arise of stock culture of thispredator, nymphs and adults were collected from maize plants, dried stalks and dried ears. The collected nymphs were introducedsingly in plastic tubes of 3 cm diameter x 5 cm height to avoid cannibalism, while the adults were confinedas couples in Petri dishes (5cm) provided with moistened filter paper discs as oviposition sites and saving humidity. Mature larvae of *P. simplex* were used for feeding the stages of the predators. The filter paper discs were renewed twice daily, as the egg are deposite inserted in the filter paper. Such discs were introduced in petri dishes of 5 cm diameter and incubated. Newly hatched nymphs were reared also solely (Tawfik and El-Hussieni, 1971).

2. Biological aspects on the hosts:

To study the host preference of *B. pallescens*, 10 couples of newly emerged adults from the stock culture, were confined in a Petri dish 5 cm diameter, provided with 10 larvae on filter paper discs, this unit represented one replicate. The fourth larval instar was used with, *P. simplex, C. gnidiella, and G. pumilatta* while, the second instar was used with *S. cretica*. Ten replicates were used and examined daily for renewing hosts. Periods of pre-oviposition, oviposition, post-oviposition and adult longevity were recorded in addition to deposited eggs/ female were daily counted. The filter paper discs were transferred to another dishes then kept under the same laboratory condition in order to determine durations of the immature stages, mortality percentages and sex ratio (Tawfik and El-Hussieni, 1971).

3. Statistical analysis:

The obtained data in all previous experments were statistically analyzed by New L.S.D. and calculated thestandard error for biological studies according toSenedecor and Cochran (1980).

RESULTS AND DISCUSSION

Biological aspects:

The anthocorid predator, *B. pallescens* was recorded as predators on several caterpillar pests in maize field. However, few available reviews were recorded about the biology of this parasitoid. Therefore, the present study was initiated to evaluate its host preference on different lepidopterous larvae.

Table (1): The hosts and larval instars used for rearing *B. pallescens*

Host	Family	Instar
Cryptoblabes gnidiella Mill.	Pyralidae	4th
Gymnoscelis pumilatta Hb.	Geometridae	
Pyroderces simplex Wlsm.	Cosmopterigidae	
Sesamia cretica Led.	Noctuidae	2nd

Immature stages:

Egg stage:

Data summarized in Table (2) indicated that, the incubation period of *B. pallescens* eggs not affected by hosts and ranged 3-5 with insignificant differences between them. Percentages of hatching recorded 93.33, 94.12, 95.14, and 95.22on *C. gnidiella, S. cretica,* and *P. simplex* respectively.Abd-Elgayed,1995 at (27°C& 57.7 R.H.%) on larvae of *P. simplex* recorded the shortest incubation period (4.05 days) which was correlated with the highest percentage of hatchability (95.83 %).

Nymphal stage:

The effect of different hosts on number of nymphal instars, durations, mortality percentages and sex ratio were investigated (Table, 3). All secured adults passed the nymphal stage through 5 instars at feeding on different hosts. These results agree with those previously recorded by Tawfik and El-Hussieni (1971) and Abd-Elgayed (1995), they found that whole of *B. pallescens* nymphs had 5 instars.

The first nymphal instar ranged between 2.14 days on *C. gnidiella* and 3.31days on *S. cretica* , while the second one ranged between 1.73 and 2.45dayson*C. gnidiella* and *P. simplex*, respectively. The third instar took the same trend but the fourth instar were recorded 4.10, 4.22, 4.32 and 4.60 days at *S. cretica*, *C. gnidiella*, *P. simplex* and *G. pumilatta*, respectively with insignificant differences between treatments. The fifth instar differed insignificantly (4.85 days) on *C. gnidiella* compared with the other hosts, the respective values were 5.25, 5.46 and 5.60 days on *G. pumilatta*, *P. simplex*and *S. cretica*.

At all experimented hosts, the highest percentages of mortalities were recorded at first and second nymphal instars, while the lowest percentage was recorded at the fifth instar. The shortest nymphal instar (19.5 days)were recorded on *S. cretica* with the highest mortality (39.2 %), while the longest period (22.6 days) were recorded on *P. simplex* associated with the lowest mortality (2.16%).

Similar finding were recorded by Tawfik and El- Hussieni (1971) and Abd-Elgayed (1995), they stated that the optimum condition for rearing *B. pallescens* on *P. simplex* were (26° C& 64% R.H.) and (27.7° C& 57.7% R.H.), respectively.

At all experimented hosts, both daily and total consumed preys by the nymphs increased gradually as the progressive nymphal instar except on the second instar when slight reduction in consumption was observed. On the other hand, the total consumed preys were 19.8, 25.6, 24.1 and 33.1 prey on *C. gnidiella, G. pumilatta, S. cretica* and *P. simplex*, respectively.

Table (2): Effect of host on incubation period (in day)and hatchability % of *B. pallescens* eggs at the laboratory conditions

Hosts	*C. gnidiella*	*G. pumilatta*	*P. simplex*	*S. cretica*
Mean	4.10a	3.96a	4.12a	4.05a
S.E.	± 0.11	± 0.12	± 0.12	± 0.11
Range	3-5	3-5	3-5	3-5
Hatchability	93.33	95.14	95.22	94.12
New L.S.D.	0.27			

Table (3): Duration (in days) of *B. pallescens* nymphal instars fed on different hosts at laboratory conditions.

Hosts	Nymphal instars						Sex ratio
	1st	2nd	3rd	4th	5th	Total	
C. gnidiella	2.14 ±0.20a	1.73 ±0.18a	3.12 ±0.20a	4.22 ±0.11a	4.85 ±0.17a	17.2 ±0.50 a	
	1-3	1-4	2-4	4-5	4-5	13-19	1:1
Mortality%	(26.20)	(19.16)	(18.6)	(9.30)	(2.60)	(30.13)	
Consumption	1.7(0.7)	1.6(0.8)	2.7(0.9)	6.2(1.5)	8.1(1.8)	19.8(1.2)	
G. pumilatta	2.45 ±0.28a	1.93 ±0.1 a	3.15 ±0.18a	4.60 ±0.12a	5.25 ±0.10b	18.3 ±0.65 b	
	1-5	1-3	2-5	4-5	5-6	14-23	1.2:1
Mortality%	(22.51)	(25.13)	(12.25)	(8.20)	(4.30)	(29.19)	
Consumption	1.8(0.9)	1.4(0.8)	3.3(1.1)	8.7(1.9)	9.1(1.7)	25.6(1.4)	
P. simplex	3.14 ±0.17b	2.45 ±0.41b	4.20 ±0.12c	4.32 ±0.11a	5.46 ±0.17b	22.6 ±0.42 c	
	2-4	2-3	4-5	4-6	5-6	18-24	1.3:1
Mortality%	(6.22)	(6.53)	(2.10)	(5.20)	(1.12)	(2.16)	
Consumption	2.7(0.9)	2.6(1.2)	5.9(1.4)	8.6(1.90)	12.9(2.8)	33.1(1.60)	
S. cretica	3.31 ±0.18b	2.41 ±0.12b	3.9 ±0.18 b	4.10 ±0.21a	5.60 ±0.11 b	19.5 ±0.62 b	
	2-4	2-3	3-5	3-4	5-6	16-24	1:1
Mortality%	(21.23)	(26.17)	(10.6)	(9.20)	(2.80)	(39.2)	
Consumption	2.2(0.9)	2.1(0.3)	4.4(1.3)	7.8 (1.8)	9.1(1.8)	24.8 (1.2)	
L.S.D.	0.52	0.42	0.43	0.38	0.26	1.50	

N.B. :1- Data in parenthesis indicates mortality %

2- * Show total consumed prey / life while the correlated parenthesized data show average of daily consumption.

3- Data with the same letter in column differed insignificantly.

At feeding on *G. pumilatta* and *P. simplex* larvae, females outnumbered males i.e., the sex ratio were 1.2:1 and 1.3:1, while this values were 1:1 under feeding on larvae *C. gnidiella* and *S. cretica*. In this respect, Tawfik and El- Hussieni (1971) indicated a sex ratio of 1.2: 1.

Adult stage:

The values of the periods of pre-oviposition, oviposition and post-oviposition were ranged between (3.10- 6.2 days), (3.20- 19.9 days) and (1.50- 1.70 days),respectively. The highest period of oviposition (19.9 day) and the highest

preying capacity (36.9) individuals were recorded at feeding on larvae of *P. simplex,* while the lowest one (6.3 day) associated with the lowest preying capacity (6.80 preys) were recorded on larvae of *S. cretica.*

Data summarized in Table (4) indicated that the male adult longevity ranged between 1.4 day at *S. cretica* and 10.1 day at *C. gnidiella* , with medium period (8.90 day) and highest preying capacity (20.1 larvae) on *P. simplex*.

The females were lived 4 weeks at feeding on *C. gnidiella* and *G. pumilatta,* and 1 week only at feeding on *S. cretica*. The longest period was extended to 5 weeks at feeding on *P. simplex* larvae. Generally, the highest number of eggs were recorded in the second week of oviposition period then decreased gradually until the fifth week.

The highest total of deposited eggs were recorded at feeding on larvae of *P. simplex* (136.30 egg / female with daily average 8.30egg / female / day), while the lowest one was recorded at feeding on larvae of *S. cretica* (7.8 egg / female with daily average 3.4egg / female / day). On the other hand, respective median values (73.2 and 78.9 egg / female) were recorded at feeding on larvae of *C. gnidiella* and *G. pumilatta* associated with (4.6 and 4.9 egg / female / day).

These results are agreement with those recorded by Tawfik and El- Hussieni (1971) at 26.4 $^{\circ}$ C and 64.0 % R.H., they found that the total number of eggs were 78.0, 13.2 and 5.7 egg when fed this predator upon caterpillars, aphids and mites, respectively. They found that the females lives long period (22.44 day) than the male (17.70 day).

In this respect, Abd-Elgayed (1995) at (27° C and 57.7 % R.H.) and on larvae of *P. simplex* recorded that the longest periods of oviposition and female longevity (19.2 and 25.3 day, respectively) correlated with the highest counts of total deposited eggs per female and rate of reproduction / female / day of oviposition period (134.3 egg / female and 7.02 egg / female / day). Under the same conditions, the highest total and daily consumed preys were recorded. Ballal, *et al.* (2003) recorded that the optimum host for the rearing of this predator on *Corcyra cephalonica* Stainton compared with *Ropalosiphum maidis*, *Thrips tabaci* and mites. While, Sobhy *et al.* (2014) recorded *B. pallescens* was abundant native predator in mango orchards in Egypt. They found that the reproductive success of individual females were greatest when fed on *Ephestia kuchniella* and reared at 25 $^{\circ}$C (84.6 ± 3.1 egg) rather either at 20°C (46.6 ± 2.0 egg) or at 30°C (65.2 ± 2.6 egg).

The obtained results at the optimum laboratory conditions (27 $^{\circ}$ C and 57.7 % R.H.) and on fourth instar larvae of *P. simplex* recorded that the longest periods of oviposition and female longevity (19.9 and 25.3 day, respectively) correlated with the highest counts of total deposited eggs per female and rate of reproduction / female / day of oviposition period (136.3 egg / female and 8.3 egg / female / day). Under the same conditions, the highest total (36.9 preys) and daily consumed preys (1.2 preys / day) were recorded.

Table (4): Effect of hosts on life span and egg laying activity of *B. pallescens* females at laboratory conditions.

Hosts	Period of (in days)			Adult longevity In days		Oviposition weeks and weekly deposited egg/ ♀					Total deposited egg/ ♀	deposited egg / ♀/ day
	Pre-oviposition	oviposition	Post-oviposition	♀	♂	1st	2nd	3rd	4th	5th		
C. gnidiella **	6.2c ± 0.17 5-7	16.6b ± 1.14 10-24	1.7b ± 0.28 1-3	24.2b ± 1.18 17-24 25.6 (1.04)	10.1 ± 1.12 4-16 16.8 (1.1)	23.8 (100)	39.4 (100)	16.4 (70)	6.2 (10)	0.0	73.2b ± 8.91 24-118	4.6b ± 0.46 1.8-7.1
G. pumilatta **	4.9b ± 0.17 4-6	16.8b ± 0.68 13-22	1.7b ± 0.28 1-3	23.1b ± 1.20 16-27 26.7 (1.1)	7.5b ± 0.78 3-14 8.9 (1.2)	22.4 (100)	45.1 (100)	16.2 (70)	6.3 (10)	0.0	78.9b ± 9.12 24-129	4.9b ± 0.45 3.7-9.2
P. simplex **	4.8 b ± 0.30 3-6	18.9c ± 0.71 17-23	1.7b ± 0.28 1-3	25.3b ± 0.93 21-30 36.9 (1.2)	8.9b ± 0.81 6-16 20.1 (2.3)	39.2 (100)	71.2 (100)	18.9 (100)	12.5 (30)	5.2 (10)	136.3c ± 11.2 72-210	8.3c ± 0.57 3.5-9.5
S. cretica **	3.1a ± 0.10 3-4	3.2a ± 0.55 2-8	1.5a ± 0.28 1-3	6.3a ± 0.57 5-12 6.8 (1.1)	1.4a ± 0.21 1-3 1.2 (0.9)	7.1 (100)	0.0	0.0	0.0	0.0	7.8a ± 1.62 3-20	3.4a ± 0.21 2.1-4.9
New L.S.D.	0.49	2.90	0.47	2.90	1.50						21.22	1.10

N.B.: 1- Data in parenthesis indicates percentage of survived females.
2- ** Show total consumed prey / life while the correlated parenthesized data show average of daily consumption.
3- Data with different letter in column significantly different.

REFERENCES

Abd-Elgayed, A. A. (1995). Studies on some maize insect pests and their natural enemies, M.SC. Thesis, Fayoum Fac. of Agric., Cairo Univ., pp.84-104.

Abd-Ella, M.M.H. (1990). Effect of different temperatures and hosts on certain biological aspects of *Bracon brevicornis* Wesm. (Hymenoptera: Braconidae), Fayoum, J. Agric. Res. & Dev., 4(1): 89-102.

Ballal, C.R., S. P. Singh, J. Poorant and T. Gupta (2003). Biology and rearing requirements of an anthocorid predator, *Blaptostethus pallescens* Poppius (Hemiptera : Anthocoridae), J. of Biol. Cont., 17(1): 29-33.

Davis, P.M. and L.P. Pedigo (1991). Injury profiles and yield responses of seedling corn attacked by stalk borer (Lepidoptera: Noctuidae) J. Econ. Entomol., 84(1): 294-299.

El-Sherif, S.I., F.F. Mostafa, F.N. Zaki and M.E. Saleh (1987). Biocontrol studies on corn borers in Egypt: 2-parasitism on *Ostrinia nubilalis* Hbn. in maize field, Bull. Fac. of Agric., CairoUniv., 38(2): 551-557.

Fayad, Y.H., Amira A. Ibrahim and A.F Lutfallah (1984). *Bracon brevicorn* is a braconid parasite on European corn borer, *Ostrinia nubilalis* Hbn., Agric., Res. Rev., 62(1):355-360.

Metwally, S. M. I. (1967). Insect funa of maize plants with special references to the interrelationship and the effect of certain insecticides on their populations, M. Sc. Thesis, Fac. of Agric., Cairo Univ.

Mostafa, F.F. (1981). Biological and ecological studies on the pink borer, *Sesamia cretica* Led., Ph. D. Thesis, Fac. of Agric., Cairo Univ.

Mostafa, F.F. and J.Y. Kirollos (1986). Host preference and biological aspects of the lopper worm, *Gymnoscelis pumilatta* Huebner (Geometridae: Lepidoptera), Fabis Newsletter,16: 29-31.

Senedecor, G.W. and W.G. Cochran (1980). Statistical methods, 7th Ed. 570 pp., Iowa Stat., Univ. Press., Ames, Iowa, USA.

Sobhy, I. S., A. M. Abdul- Hamid, A. A. Sarhan, A. A. Shoukry, N. S. Mandour and S. R. Reitz (2014). Life history traits of *Blaptostethus pallescens* Poppius (Hemiptera : Anthocoridae) a candidate for use augmentative biological control in Egypt, Applied Entomology and Zoology, 49(2): 315-324.

Soliman, H.S. (1940). Studies on the biology of *Microbracon hebetor* Say. (Hymenoptera: Braconidae), Bull. Soc. Fouad 1st ent., 24: 215-247.

Tawfik, M.F.S. and M. M. El- Hussieni (1971). The life history of the anthocorid predator, *Blaptostethus piceus* Fieber Var. *Pallescens* Poppius (Hemiptera : Anthocoridae), Bull. Soc. Ent. Egypte, 55:239- 252.

التفضيل العائلى للمفترس *Blaptostethus pallescens* (نصفية الأجنحة : انثوكورودى) على بعض يرقات حشرات حرشفية الأجنحة على الذرة

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الملخص العربي

تم إجراء هذه الدراسة سنة ٢٠١٢ لمعرفة التفضيل العائلى ودراسة بعض الصفات البيولوجية للمفترس *Blaptostethus pallescens* (نصفية الأجنحة : انثوكورودى) في معمل قسم وقاية النبات بكلية الزراعة – جامعة الفيوم تحت الظروف المثلى للتربية وهى درجات حرارة ٢٧ ± ١ م° و٧٠٥٧± ٥٪ رطوبة نسبية ، حيث تم تربية المفترس على يرقات أربعة آفات حشرية تتبع رتبة حرشفية الأجنحة وتصيب الذرة الشامية وهى : دودة الكربتوبلابس ودودة الذرة القياسة و دودة الذرة القرنفلية و دودة القصب الكبيرة ، ولقد أظهرت النتائج التي تم الحصول عليها أن هذا المفترس يفضل يرقات العمر الرابع لدودة الذرة القرنفلية ثم دودة الذرة القياسة ثم يرقات دودة الكربتوبلابس اما يرقات دودة القصب الكبيرة فهي عائل غير مفضل لهذا المفترس.