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COMPARATIVE BIOLOGICAL AND LIFE TABLE PARAMETERS OF *Coccinella undecimpunctata* L. AND *Cydonia vicina isis* Cr. (Coleoptera: Coccinellidae) REARED ON CEREAL APHID, *Sitobion avenae* (Fabr.) (Hemiptera: Aphididae).

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ABSTRACT

The developmental time and rate of immature stages, survival percentage, longevity, fecundity, and life table parameters of *Coccinella undecimpunctata* and *Cydonia vicina isis* by rearing on cereal aphid, *Sitobion avenae* were studied under laboratory conditions. The relationship between female age and fecundity rate of females was also determined.

The total developmental time from egg hatching to adult eclosion was 9.80±0.19 and 10.30±0.43 days for *C. undecipunctata* and *C. vicina isis*. Survival percentage from egg hatching to adult emergence differed significantly between the two predators when fed on *S. avenae*. There was no significant difference in longevity of females, while there were significant variations in fecundity of females and longevity of males. Simple linear regression between female age and fecundity rate of *C. undecimpunctata* females indicated that there was no relationship between female age and female fecundity rate. Considering *C. vicina isis*, there was a negative relationship between female age and fecundity rate. This means that the fecundity rate gradually decreased as the age of female increased.

The calculated value of (T) was shorter with *C. vicina isis* than *C. undecimpunctata*. In contrast, (DT) was shorter with *C. undecimpunctata* than with *C. vicina isis*. In addition, GRR, R_o, r_m and λ values were higher with *C. undecimpunctata* than *C. vicina isis*. The survivorship (*Lx*) for female age intervals was high (0.96) with *C. vicina isis*, while with *C. undecimpunctata*, the value of (*Lx*) was relatively high (0.92). Maximum oviposition rate per female per day (*Mx*) was 35.88 on 58^{th} day, and 13.62 on 2^{nd} day with *C. undecimpunctata* and *C. vicina isis*.

Keywords: Coccinellidae, *Coccinella undecimpunctata*, *Cydonia vicina isis*, *Sitobion avenae*, biological characteristic, life table parameters.

INTRODUCTION

The family Coccinellidae is a potentially important predatory insect group found throughout the world on many economic crops. Some species may have a significant role in the biological control of aphid species, whiteflies, and other soft-bodied insects. *Coccinella undecimpunctata* and *Cydonia vicina isis* are the most important predators from this family encountered in Egyptian agroecosystem. (Ghanim and El-Adl, 1987 "a & b"; Darwish and Ali, 1991; El-Saadany *et al.*, 1999). Several studies drew attention to the importance of these coccinellid species as aphidophagous predators (Abdel-Salam, 1995; El-Hag and Zaitoon, 2000; Nasser *et al.*, 2000). Detailed studies on feeding capacity, prey preference of their larval and adult stages, seasonal abundance, effect of insecticides, their enemies and assessment of their role against several insect pests have been studied extensively (Abou Zeid *et al.* 1978; Ghanim and El-Adl,1987 "a & b"; Eraky and Nasser, 1993; El-Hag and Zaitoon 1996). They could make good candidates for mass rearing and release in pest hot spot infestations in open fields and greenhouses, because they have good search activity and high consumption rate. In order to use these predators in biological control programs, it is necessary to understand biological and life table attributes for them prior to mass production and release. Knowledge of biological parameters is essential for assessing the potential rate of increase for a population.

Life table parameters are essential to know the general biology of an insect and provide a valuable picture for the fecundity and growth potential of these predators under prevailing environmental conditions. Population growth rate is a basic ecological characteristic. It is usually expressed as the intrinsic rate of natural increase (r_m) which is regarded as the best available single description of the population growth of a species under given conditions (Southwood and Henderson, 2000). The intrinsic rate of natural increase (r_m) can be used for predator's selection. Morever, r_m is a suitable for evaluation of the mass rearing quality of biological control agents. It can be determined by its developmental time and reproduction rate. It has been used to compare a species under different environmental conditions and as an index of population rate response to selected preys (Birch 1948; Hulting *et al.*, 1990.; Roy *et al.*, 2003; Lanzoni *et al.*, 2004)

However, scanty attention has been paid on the growth, development and life table parameters of these predators to compare these parameters for choosing them to mass rear and release. Therefore, the present experiment has been designed to compare between certain biological characters and life table parameters for coccinellid predators under laboratory conditions.

MATERIALS AND METHODS

I. Rearing of immature stages

Adults of *C. undecimpunctata* and *C. vicina isis* were collected from maize fields at the Experimental Research Station, Faculty of Agriculture, Mansoura University and reared on cereal aphid (CA), *Sitobion avenae* (Fabr.). The eggs laid by females were removed daily, and monitored until hatching. To avoid cannibalism, the hatched larvae of these predators were reared individually in petri dishes (9 cm in diameter). A piece of filter paper was placed on the bottom of each dish to provide a walking surface for the larvae. Twenty five larvae from each predator were reared on CA. Each reared larva was considered to be a replicate. The developmental time and rate (1/developmental time) (Omakar and James, 2004) of immature stages, survival from eggs to adult eclosion, and sex ratio were recorded.

II. Rearing of adult stage

After eclosion, 10 males and 10 females from the two predator species were also fed on CA until development was completed. The longevity of females was divided to three periods according to Phoofolo and Obrycki, (1995) and Lanzoni *et al.* (2004) The pre-oviposition period was measured as the number of days between female eclosion and initiation of egg laying, while inter-oviposition one as the number of days between two successive ovipositions, and finally the oviposition period was equivalent to the inter-oviposition period plus the number of days during which oviposition occurred. The fecundity of female, fecundity rate (number of progeny produced per female per day (Kaakeh and Dutcher, 1993) and the longevity of males were recorded. Life table parameters were calculated using a BASIC computer program (Abou-Setta *et al.* 1986) for females reared on CA. This computer program is based on Birch's method (1948) for the calculation of an animal's life table. Constructing a life table, using rates of age-specific (Lx), and fecundity (Mx) for each age interval (x) was assessed. To compare the biotic potential of the two predators fed on CA, the following population growth parameters were determined: the mean generation time (T), gross reproductive rate (GRR) (=ΣMx), the net reproductive increase (R_o), the intrinsic rate of increase (r_m), and the finite rate of increase (λ). The doubling time (DT) was calculated according to Mackauer's method (Mackauer 1983). The life tables were prepared from data recorded daily on developmental time (egg to first egg laid), sex ratio, the number of deposited eggs, the fraction of eggs reaching maturity, and the survival of females. Interval of one day was chosen as the age classes for constructing the life table.

All of the experiments were run in an air-conditioned insectary at 28.0 ± 2.0°C, 75.0 ± 5% RH and photoperiod of 14L:10D.

III. Data analysis

Data for developmental time of immature stages, survival, pre-oviposition, inter-oviposition, and oviposition periods, the fecundity, the fecundity rate, and the males longevity of *C. undecimpunctata* and *C. vicina isis* reared on CA were subjected for one way analysis of variance (ANOVA), and the means were separated using Duncan's Multiple Range Test (Costat Software, 1990).

RESULTS

I. Developmental times of immature stages

Analysis of variance (ANOVA) indicated that there was no significant variation in the incubation period between *C. undecimpunctata* and *C. vicina isis* (P= 0.179) (Table 1). Also, data in the same table showed that developmental time of the four larval instars was 1.20±0.13, 1.20±0.0.13, 1.10±0.09 and 1.90±0.09 days, respectively for *C. undecimpunctata*, and 1.10±0.09, 1.00±0.00, 1.00±0.00, and 2.90±0.17 days, in succession for *C. vicina isis*, with no significant difference between the two predators in 1st, 2nd, and 3rd instar larva (P= 0.619, 0.151, 0.330). While in the 4th instar, there was a significant variation between the two predators (P=0.000). The developmental time of larval stage was 7.1±0.26 and 8.0±0.32 days with no significant difference (P=0.052) between the two coccinellids. The pupal stage averaged 2.7±0.15 and 2.40±0.16 days for *C. undecimpunctata* and *C. vicina isis* with no significant difference (P= 0.196). Developmental rate was better for *C. undecimpunctatat* (0.102) than *C. vicina isis* (0.097). Developmental percentages of eggs,1st, 2nd, 3rd, 4th, and pupal of *C. undecimpunctata* were 17, 12, 12, 11, 19, and 29%. Whereas these percentages were 18, 11, 10, 10, 28 and 23%, respectively for *C. vicina isis* (Table 1). Based on statistical analysis, the duration from egg hatching to adult eclosion did not significantly differ between the two coccinellid predators (P=0.322). Survival percentage from egg to adult of *C. undecimpunctata* and *C. vicina isis* was 92.0% and 96.00% with significant variation (P=0.008) (Table 1).

Table (1): Duration (in days), rate of the developmental stages (mean± SE)[a], and their percentage[b] of *C. undecimpunctata* and *C. vicina isis* reared on cereal aphid, *S. avenae* under laboratory conditions.

Coccinellid species	Incubation period	Larval instars					Pupal stage	Developmental rate	Days to reach the adult stage	Survival %
		1st	2nd	3rd	4th	Total				
C. undecimpunctata	1.70± 0.15 a (17%)	1.20± 0.13 a (12%)	1.20± 0.13 a (12%)	1.10± 0.09 a (11%)	1.90± 0.09 b (19%)	7.10± 0.26 a	2.70± 0.15 a (29%)	0.102	9.80± 0.19 a	92.0 b
C. vicina isis	1.90± 0.09 a (18%)	1.10± 0.09 a (11%)	1.00± 0.00 a (10%)	1.00± 0.00 a (10%)	2.90± 0.17 a (28%)	8.00± 0.32 a	2.40± 0.16 a (23%)	0.097	10.30± 0.43 a	96.0 a

[a] **Means followed by the same letter in a column are not significantly different at the 1% level of probability (Duncan's Multiple Range Test).**

[b] **Values between brackets are instar or stage development percentage to the total development of immature stages.**

II. Longevity and fecundity of adult stage

Longevity and fecundity of *C. undecimpunctata* and *C. vicina isis* adults fed on CA are given in Table (2). Pre-oviposition, inter-oviposition, and oviposition periods for *C. undecimpunctata* took 3.6±0.16, 11.0±1.89, and 30.3±2.96 days respectively, while these periods lasted 3.2±0.47, 15.0±2.61, and 30.3±3.01 days for *C. vicina isis*. There were no significant differences in these periods between the two coccinellids (P= 0.448, 0.246, and 0.912). In addition, no significant variation has been noted in longevity of females of these two predators (P=0.586) (Table 2). Male longevity was significantly shorter (33.2±2.15 days) with *C. undecimpunctata* than with *C. vicina isis* which fed on the same prey (48.5±4.75 days) (P=0.006). Concerning the fecundity of females, the average number of eggs per female of *C. undecimpunctata* and *C. vicina isis* was 705.7±79.48 and 472.1±39.98 with significant difference between them (P= 0.022) (Table 2). In addition, the results in Table (2) showed that fecundity rate was significantly lower with *C. vicina isis* than with *C. undecimpunctata* (P=0.001).

Table (2): Longevity and fecundity (mean±SE)[a] of *C. undecimpunctata* and *C. vicina isis* reared on cereal aphid, *S. avenae* under laboratory conditions.

Coccinellid species	Sex	Longevity (in days)				Mean total fecundity	Fecundity Rate (No. eggs/ female/day)
		Pre-Oviposit-ion	Inter-Oviposit-ion	Oviposit-ion	Total longevity		
C. undecimpunctata	♂	-	-	-	33.2± 2.15 B	-	-
	♀	3.6± 0.16 a	11.0± 1.89 a	30.3± 2.96 a	44.9± 3.93 a	705.7± 79.48 a	23.49± 1.6.00 a
C. vicina isis	♂	-	-	-	45.3± 2.90 A	-	-
	♀	3.2± 0.47 a	15.0± 2.61 a	30.3± 3.01 a	48.5± 4.75 a	472.1± 39.98 b	16.05± 0.89 b

[a]Means followed by the same small or capital letter in a column are not significantly different at the 1% level of probability (Duncan's Multiple Range Test).

Simple linear regression between female age (independent variable X) and fecundity rate (dependent variable Y) of *C. undecimpunctata* females yielded R^2=0.0636 (P=0.049). The regression equation was derived: Female fecundity rate (Y) = 11.610-0.0937 female age (X). This equation indicated that there was no relationship between female age and female fecundity rate (Fig. 1). Considering *C. vicina isis*, the value of R^2 was 0.5224 (P=0.000) and the regression equation was Y= 8.660-0.1204X. This equation indicated that there was a negative relationship between female age and fecundity rate which means that the fecundity rate gradually decreased as the age of female increased (Fig. 1).

III. Life table parameters

Data presented in Table (3) illustrate the life table parameters of *C. undecimpunctata* and *C. vicina isis* females. The mean generation time (*T*) was 21.13 and 20.59 days for the two coccinellid predators. The population of these predators could be doubled every 2.51 and 2.63 days when females fed on CA. The value of gross reproductive rate (GRR) was higher (530.9) with *C. undecimpunctata* than *C. vicina isis* (393.9). GRR refers to the sum of the average number of females produced per living female per day. This value is greater than the simple mean estimate of total fecundity per female per generation. The net reproduction rate (R_o), representing the total female births was 341.53 for *C. undecimpunctata*. This meant that the population of this predator would be able to multiply 341.53 times when fed on CA at the end of each generation (T=21.13 days). The R_o value was 228.39 for *C. vicina isis*. The value of the intrinsic rate of increase (r_m) was 0.27661 with *C. undecimpunctata*. Whereas, with *C. vicina isis*, this value was 0.2636 (Table3). The finite rate of increase (λ) was 1.3179 and 1.3017 for the two tested predators indicating that the population had the capacity to multiply 1.3179 and 1.3017 times per female per day. From data illustrated in Fig. (2), it could be noted that the survivorship (*Lx*) for female age intervals was high (0.96) with *C. vicina isis*, which means that most of eggs had developed to maturity, and death happened gradually after an extended ovipositional period. While with *C. undecimpunctata*, the value of (*Lx*) was relatively high (0.92). Maximum oviposition rate per female per day (*Mx*) was 35.88 on 58th day, and 13.62 on 2nd day with *C. undecimpunctata* and *C. vicina isis*.

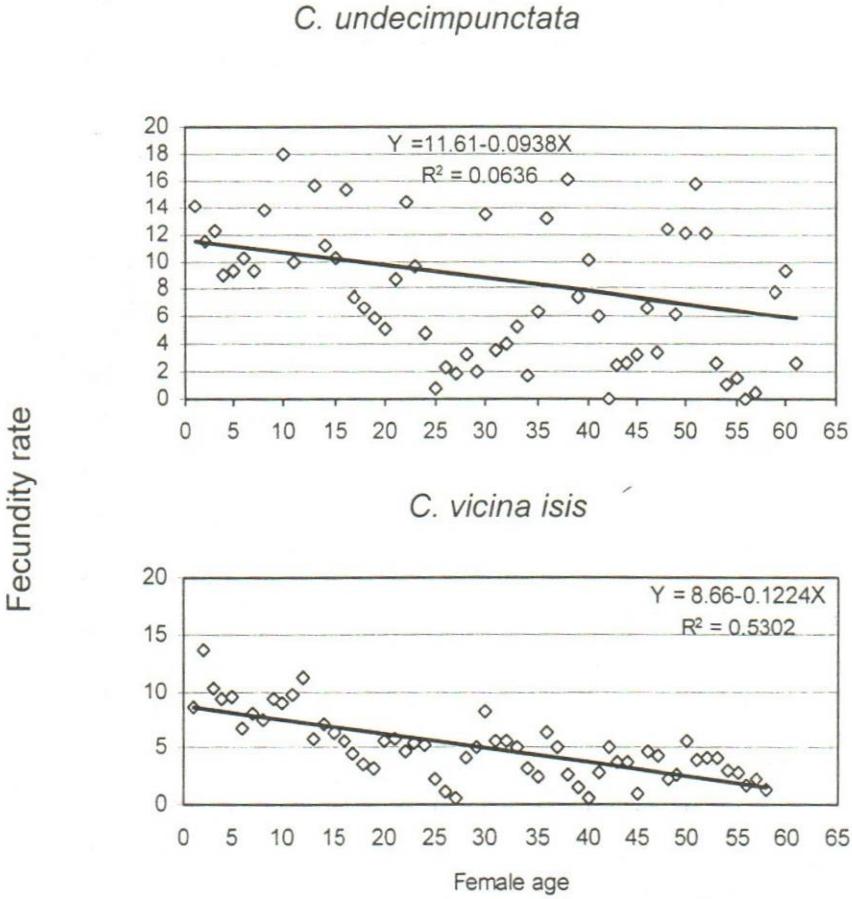

Fig. 1: Simple linear regression between female age (X) and fecundity rate (Y) of *C. undecimpunctata* and *C. vicina isis* reared on cereal aphid, *S. avenae* under laboratory conditions.

Table (3). Values of life table parameters of *C. undecimpunctata* and *C. vicina isis* reared on cereal aphid, *S. avenae* under laboratory conditions.

Species	Mean generation time (T) (in days)	Doubling time (DT) (in days)	Gross reproductive rate (GRR)	Net reproductive rate (R_O)	Intrinsic rate of increase (r_m)	Finite rate of increase (λ)
C. undecimpunctata	21.13	2.51	530.9	341.53	0.2761	1.3179
C. vicina isis	20.59	2.63	393.9	228.39	0.2636	1.3017

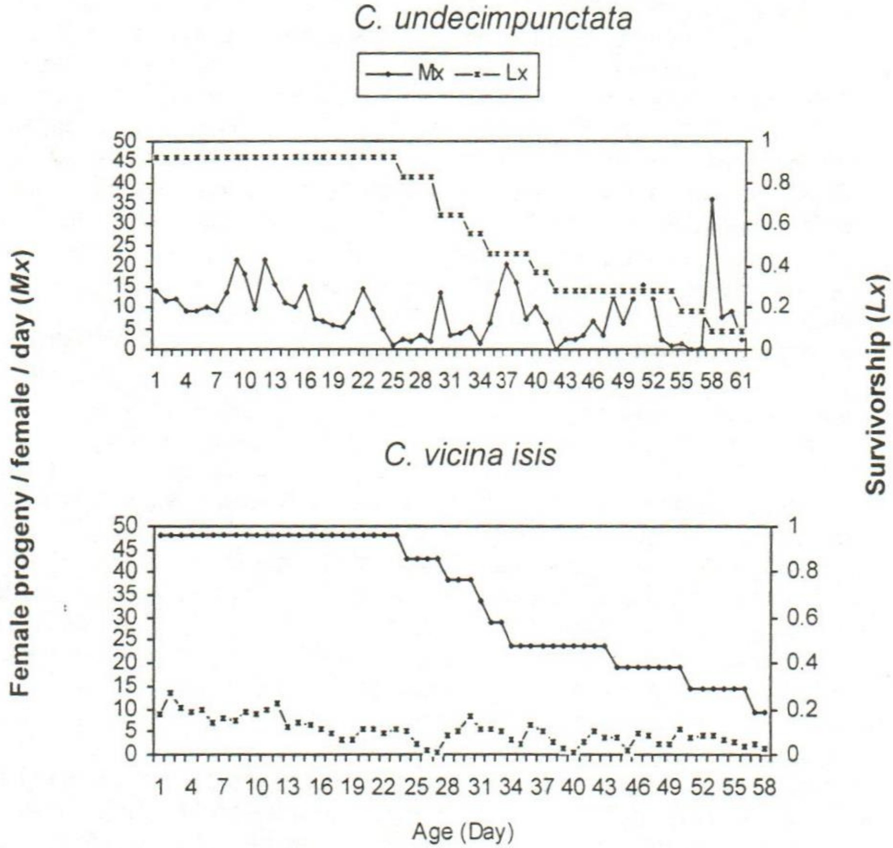

Fig. (2): Age-specific fecundity (Mx) and survivorship (Lx) of *C. undecimpunctata* and *C. vicina isis* reared on cereal aphid, *S. avenae* under laboratory conditions.

DISCUSSION

Mass production of coccinellid predators in biological control programs requires huge numbers at low costs. It is desirable to choose the predator, which has short developmental times, a high survival rate, and a high reproductive capacity.

The finding in this study illustrated that there was no apparent difference concerning the incubation period between *C. undecimpunctata* and *C. vicina isis*. Abou Zeid *et al.* (1978) reported that the incubation period of *C. undecimpunctata* was 2.7 days at 26-28^{0}C. Eraky and Nasser (1993) mentioned that this period for the same predator was 2.0 days at 30^{0}C. While, El-Hag and Zaitoon (1996) found this period was 3.5 days at 25.0±2.0^{0}C.

In this study, developmental times of larval, pupal stages, and days to reach adult stage were 7.1, 2.7, and 9.8 days for *C. undecimpunctata* and 8.0, 2.4, and 10.3 days for *C. vicina isis*. Abou Zeid *et al.* (1978) recorded 17.4, 4.8, and 22.2 days for these times for *C. undecimpunctata* on *Heliothis armigera* Hb. larvae. Ghanim and El-Adl (1987 a) found that larvae of *C. undecimpunctata* and *C. vicina isis* took 10.0 and 9.0 days when reared on both aphids, *Rhopalosiphum maidis* (Fitch.) and *S. avenae* at fluctuated temperatures during the second half of July. When *C. undecimpunctata* reared on *Rhoplalosiphum padi* L., the larvae, pupae, and complete immature stages averaged 7.0, 2.5, and 12.0 days at 30^{0}C (Eraky and Nasser, 1993), whereas on *Brevicoryne brassicae* L. and *R. padi* at 25.0±2.0^{0}C, these times were 12.2, 4.9, and 20.6 days (El-Hag and Zaitoon, 1996). Also, they found survival percentage was 61.5% during immature stages. This percentage was less than the survival percentage achieved in this study (92.0%).

Regarding the longevity of the two coccinellids, there was no statistical variation between them, while there was a significant difference concerning the fecundity and fecundity rate. Abou Zeid *et al.* (1978) found that the longevity of *C. undecimpunctata* adult stage was 90 days on *H. armigera* larvae. Fecundity and fecundity rate were 1052.9 and 739.5 eggs per female for *C. undecimpunctata* and *C. vicina isis* with a daily mean of 25.68 and 19.46 on *R. maidis* (Ghanim and El-Adl 1987 b). Eraky and Nasser (1993) noted that egg production per female of *C. undecimpunctata* was 142.33 at 26^{0}C. Whereas, El-Hag and Zaitoon (1996) mentioned that oviposition and longevity periods for *C. undecimpunctata* females were 29.8 and 70.0 days. They found that number of eggs laid per female and daily mean of eggs were 370.5 and 12.4 eggs when reared on *B. brassicae* and *R. padi*. These values varied with the results of the current study may be due to differences in prey species or temperatures tested. Based on regression analysis, there was a negative relationship between female age and fecundity rate of *C. vicina isis* (R^2 value =0.5302). This means that females peaked early in oviposition, and then gradually declined as female aged.

Scanty information is available concerning life table parameters of the two tested coccinellids. Only one report by El-Hag and Zaitoon (1996) who noted that T, R_o, and r_m of *C. undecimpunctata* were 20.0 days, 84.9, and 0.093, respectively. Whereas, there were some investigations on life table parameters of other aphidophagous coccinellids for comparison (Table 4).

From literature survey summary in this Table, it can be concluded that the shortest mean generation time (*T*) was recorded with *Coccinella novemnotata* Herbst while the longest (*T*) was observed with *Hippodamia variegata* (Goeze). The highest values of (R_o) were recorded with *Coccinella septempunctata* L. and *C. undecimpunctata*. While the highest value of r_m and λ were 0.2761 and 1.3179 with *C. undecimpunctata*. These differences may be due to the effects of environmental changes or to differences in prey species or temperature. In addition, *C. undecimpunctata* and *C. vicina isis* had highest capacity to multiply their population than other aphidophagous coccinelids (Table 4).

Table (4): Summary of life table values of certain aphidophagous coccinellids.

Coccinelid species	T	R_o	r_m	λ	Reference
Olla v-nigrum Mulsant	-	-	0.160	-	Chazeau *et al.* (1991)
Coccinella septempunctata L.	37.20	559.6	0.170	1.200	Phoofolo and Obrycki (1995)
Adonia variegata Goeze	20.1	45.6	0.082	-	El-Hag and Zaitoon (1996)
Coccinella novemnotata Herbst	20.0	52.8	0.086	-	
C. undecimpunctata	20.6	84.9	0.093	-	
Coleomegilla maculata DeGeer	41.10	54.00	0.100	1.100	Phoofolo and Obrycki (1997)
Scymnus apetzi (Mulsant)	40.7	137.5	0.122	-	Atlihan and Koydan (2002)
Scymnus subvillosus (Goeze)	38.3	69.9	0.110	-	
Harmonia axyridis Pallas	38.81	26.27	0.089	-	Lanzoni *et al.* (2004)
Hipodamia variegata (Goeze)	41.88	52.75	0.114	-	
Adalia bipunctata L.	40.06	18.49	0.081	-	
C. undecimpunctata	21.13	341.53	0.2761	1.3179	This study
C. vicina isis	20.59	228.39	0.2636	1.3017	

In theory, a predator that has a population growth rate equal to or greater than its prey should efficiently regulate the population of its prey (Sabelis, 1991). Population growth rate is usually expressed as the intrinsic rate of increase (r_m). Life table values of some important aphid and whitefly species, which distributed in Egyptian agroecosystem are presented in Table (5). From the r_m values in this Table, it would appear that the two studied coccinellids in this report have greater r_m than the following species, *S. avena, Myzus persicae* (Sulzer), *Aphis nerii* Boyer de Fonsclombe, and *Bemisia argentifolii* Bellows and Perring by 1.8, 1.8, 1.3, and 2.3 times with *C. undecimpunctata* and 1.8, 1.7, 1.3, and 2.2 times with *C. vicina isis*. Thus, it can be concluded that in the absence of extrinsic sources of mortality, the two studied coccinellids have the ability to regulate the three aphid species and whitefly in the fields. In contrast, *Aphis gossypii* Glover, *R. padi*, *R. maidis*, and *Aphis craccivora* Koch. have greater r_m by 1.3, 1.9, 1.5, and 1.6 times than *C. undecimpunctata* and 1.4, 2.0, 1.8, and 1.7 times than *C. vicina isis*, respectively. These aphid species are commonly abundant on several field, vegetable crops, ornamental shrubs, and fruit trees and caused sufficient damage to their host plants. Thus, biological control of these species needs huge numbers from mass production of the coccinellid species to keep the population increase of these aphid species under economic threshold.

Table (5): Values of life table parameters of certain aphid and whitefly species which commonly controlled by *C. undecimpunctata* and *C. vicina isis*.

Aphid and whitefly species	T	DT	GRR	R_o	r_m	λ	Reference
A. gossypii	6.4	1.9	-	10.2	0.36	1.43	Xia *et al.* (1999)
R. padi	-	-	-	-	0.52	-	Asin and Pons (2001)
R. maidis	8.60	1.65	36.75	53.59	0.4189	1.5204	Abdel-Salam (2004)
A. carccivora	8.96	1.55	54.44	73.88	0.4459	1.5620	
A. nerii	8.66	3.36	8.66	14.10	0.2061	1.2289	
M. persicae	28.31	4.53	-	88.62	0.153	1.165	Sood and Singh (1997)
S. avenae	-	-	-	-	0.15	-	Asin and Pons (2001)
B. aregentifolii	-	-	-	-	0.12	-	Van Giessen *et al.* (1995)

In conclusion, *C. undecimpunctata* has a shorter developmental time of immature stages, a relatively higher survivorship, a moderately longevity, a higher fecundity, and a higher intrinsic rate of natural increase (r_m) than *C. vicina isis*. This predator presents excellent opportunity for increasing of biological control agent that is monitored and manipulated in an integrated pest management (IPM). Finally, it has a fine potential for mass rearing and periodic release.

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مقارنة بيولوجى وجدول الحياة لكل من أبوالعيد ١١ نقطة وأبوالعيد الأسود عند تربيتهما على منّ الحبوب تحت الظروف المعملية

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تم دراسة فترات ومعدل النمو والبقاء survival ، الحياة longevity وكذلك كفاءة الأنثى فى وضع البيض fecundity لنوعين من مفترسات فصيلة أبوالعيد وهما أبوالعيد ١١ نقطة وأبوالعيد الأسود وذلك بتربيتهما على حشرة منّ الحبوب *S.avenae* تحت الظروف المعملية.وكذلك تم دراسة العلاقة بين عمر الأنثى ومعدل وضعهاللبيض لكلا المفترسين .
أظهرت النتائج أن طول فترة النمو من فقس البيض وحتى خروج الحشرات الكاملة من طور العذراء كانت ٩,٨ ± ٠,١٩ ، ١٠,٣ ± ٠,٤٣ يوم لكل من المفترسين على التوالى. وأوضحت النتائج أن هناك فرق معنوى بين كلا المفترسين بالنسبة لمعدل البقاءSurvival . بينت النتائج عدم وجود فروق معنوية فى فترات الحياة longevity للإناث بينما وجد فرق معنوى للذكور لكل من المفترسين ، وكذلك وجود فروق معنوية فى كفاءة الأنثى فى وضع البيض fecundity عند تغذية المفترسين على حشرة منّ الحبوب. أشارت النتائج أيضا عدم وجود إرتباط معنوى بين عمر الأنثى ومعدل وضع البيض لمفترس أبوالعيد ١١ نقطة بينماعلى العكس وجد إرتباط سلبى قوى مع مفترس أبوالعيد الأسود وهذا يعنى أن معدل وضع البيض يقل كلما زاد عمر الأنثى.

كما أظهرت النتائج أيضا أن قيم جدول الحياة المحسوبة لمتوسط فترة الجيل (T) كانت أقل مع مفترس أبوالعيد الأسود وأطول مع مفترس أبوالعيد ١١ نقطة بينما حدث العكس مع الزمن اللازم للتضاعف (DT) . بينما كانت قيم معامل التضاعف (R_o) ، معدل التكاثر (GRR) ، معدل الزيادة الطبيعى (r_m) ، ومعدل الزيادة النهائى (λ) كانت مرتفعة للمفترس أبوالعيد ١١ نقطة عن أبوالعيد الأسود. أوضحت النتائج أن معدل البقاء survivorship كان مرتفعاً مع أبوالعيد الأسود (٠,٩٦) عنه مع أبوالعيد ١١ نقطة (٠,٩٢) . وكان أقصى معدل وضع للبيض لكل أنثى لكل يوم (Mx) هو ٣٥,٨٨ عند اليوم ٥٨ بالنسبة لحشرة أبوالعيد ١١نقطة وكان هذا المعدل ١٣,٦٢ عند اليوم الثانى لحشرة أبو العيد الأسود.