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Study of some Biological and Ecological aspects of the fly *Chrysomya albiceps* (WIEDEMANN)(DIPTERA; CALLIPHORIDAE)

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ABSTRACT

The effects of temperature on some biological aspects of Chrysomya albiceps (Wied.) were studied. The incubation, larval and pupation periods as well as mortality were calculated at constant temperature and relative humidity. The temperature 30Co was preferable to egg and larval stages, whereas the 32Co was preferred for pupal stage.Sex-ratio was affected by temperature, the results declared that male emergence of high rate compared with the female in each treatment, but this rate decreased gradually with the increase of temperature.The adults which were reared at laboratory temperature of 24Co appeared to have increased longevity in both sexes, but the female did not deposit egg ; while 30 Co was preferable for fly for egg deposition.

Introduction

Chrysomya albiceps (Wied.) occur in different region of the world: Africa, Southern Europe, Southwest Asia , East and Northwest India (1) and South America
(2). It is ubiquitous Sudia Arabia, commonly found in hospital, homes, slaughterhouses, markets, garbage and gardens (3).

Chrysomya albiceps is of medical and veterinary importance, it consider typical secondary myiasis fly and since its larvae are not able to strike sheep without the assistance of primary maggots (1, 4, 5).

This species common in Summer, although in lower number than in Autumn, while in Winter its presence is extremely rare (6), and this species is Summer carrion breeder(7).

Flies have been implicated in the direct and indirect mechanical transmission of number of pathogen agents responsible for human disease, especially those causing diarrheal illness. The common factor in the ecology of several species of flies is their utilization of decomposing organic materials as food sources for the adults and as developmental media for their larvae. Considering that these materials are often carrion, feces and food wastes (all with associated pathogens) (8) , on the other hand ; the larvae of this species play more significant role as a predator of other dipteran larvae (4).

The dangers of its presence in open and covered markets, garbage dumps and other biotopes because this species breeds extensively on human feces and decomposing animal tissue (9) .

In Iraq the species of Chrysomya albiceps (Wied.) was reported by Derwesh (1965) (10) .

As a result to the medical and veterinary importance and rare studies on this species in Iraq, some biological and ecological aspects of Ch. albiceps have been studied.

Materials and Methods

Postfeeding larvae of blow fly Chrysomya albiceps were obtained from exposed fish and rabbit carcasses in the garden of Iraq Natural History Museum ,Bab Al-Muadham,Baghdad. The larvae were placed in a jar containing soil for pupution at 24±1 Co and 70% R.H. (11). Emerging flies were maintained in rearing cage (30 ×30 × 30) cm covered with fine–meshed net placed at room conditions and natural light (approximately of 8 h daily). The front side of the cage was provided with a cotton cloth sleeve for access to retrieve dead flies and exchange food dishes. The cages (stock colony and other treatment) were supplied with sugar crystals and 10% sugar solution in Petri dishes. A fresh or frozen beef liver and ground

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beef were provided in each cage for 8 h as a source of protein and egg deposition medium.

Egg batches then removed from medium by means of a fine hairbrush to small Petri dishes containing 2% sodium hydroxide solution to dissolve the agglutinated material responsible for cementing the egg masses and to separate eggs for counting (12) . The egg laying period for each replicate cage (there are three replicate used in each treatment) was calculated according to Fletcher (13) . The egg viability was calculated; three replicates of a known number of eggs from each treatment were randomly chosen and placed on dry filter paper in a covered Petri dish. The number of emerged larvae under temperature degree in each treatment was counted.

Egg hatching placed into glass rearing jar (10cm diameter) containing ground beef, the rearing jars were kept in the incubator.

Larvae were checked daily until pupation (the mature larvae leave the food medium and fall in container filled with soil placed under rearing jar) to determine larval development time .The pupae kept in clear container in an incubator .

Total number of pupae was counted and larval mortality rates were calculated. The adult emergence counted by sex and transferred to breeding cages (100 adults were placed in each replicated) to study of longevity and fecundity.

Total numbers of adults that emerged from pupae for each temperature degree in this study were counted and pupal mortality rates calculated. Mean longevity for each sex was calculated by multiplying the number of flies that died each day by the number of days they had lived, summing these values and dividing with the initial number of flies.

The duration of minimum preoviposition period from emergence of the female adult to the first egg batch deposited and the duration of maximum oviposition period from first egg batch to last egg batch deposited for each replicate was calculated; the mean duration of minimum post – oviposition period for females which had lived after the last egg batch deposited was calculated at each treatment.

Results and Disccusion

Tables 1&2 showed some biological and ecological aspects of Chrysomya albiceps studied in laboratory under constant temperature and relative humidity (R.H.) for (egg, larval and pupal stages),but in adult stage the study conducted under laboratory temperature (table 3).

Results showed that temperature affect Incubation period and hatchability (table 1). Longest incubation period (20 h.) at 30 Co , whereas it (18 h.) at 32 Co and 70%R.H. . Hatching rate was highest (87.2 %) at 30 Co . Many eggs laid in autumn were fail to hatch (14) .These result assured by Zumpt (1) who reported that the egg hatch depending on the temperature, within 24-36 hours, whereas Queiroz (15) found that incubation period (16 h.) at 27 Co. There is no larval hatching at 9Co(16) , also Al-Misned (17) found that egg hatch was 70% at 25±1 Co and 60-65%R.H.

Likewise,the duration of larval stage is affected by rearing condition (table 1) , the shorter length (3 days) was when reared at 32 Co , whereas it was (4 days) at 30 Co . Maximum mortality of this stage was (30.69%) at 32 Co , whereas it was minimum (24.26%) at 30 Co at 70%R.H. The present results assured by previous studies: The larvae migrate for pupation after 4 days under summer conditions (1) , while Smit (14) stated that during the winter the maggots tend to die soon after forming the puparium . The larvae hatched at 15Co but no pupation(16) , whereas Queiroz (15) found that larval stage period 18-24 (mean 21) days in 18Co , but no larvae reaching to pupae , also reported that larval viability were higher at 27Co and 32Co than 22Co.

Maximum pupal period was 6 days at 25 Co , minimum period (4.5) days at 32 Co , whereas it was (5.0) days at 30 Co and 70% R.H. (table 2) . Also, the results showed that higher pupal mortality (61.88%) at 25 Co , lowest mortality was 6.28% at 32 Co , whereas it was 25.13 % at 30 Co and 70%R.H. Many studies assured that pupal period and mortality were depending on many physical factors, the greater important was temperature (14 ,7) . The fly emergence from the pupa about 1 week under summer conditions (1) , whereas Queiroz (15) found that longest pupal stage duration(8-11)days at 22Co , while the lowest (3-4) days at 32Co , but he did not specify the relative humidity (R.H.) which was used in his work. On the other hand the pupal viability was higher at 27 – 32)Co than at 22Co , these are in agreement with present results.

Sex ratio was also affected by temperature (table 2) , it was higher 4.32 : 1 (males: females) at 25 Co , whereas the rate was nearly equal at 30 and 32

C0 (1.8 : 1 , 1.3 :1 respectively) . The previous studies on other species showed that sex ratio was affected by temperature too, but to much less degree, The male rate to exceed females lightly (for Chrsomya bezziana Vill. and Ch. megacephala (Fab.) species) , however, the present and that previous study are in accordance in some results , such as that high diference rate (males : females) are decrease gradually with the increase in temperature nearby from rate (1: 1) (18).

Table (3) show that minimum preoviposition period was (5) days at 32 Co , and (19) days at 30 Co . The oviposition period was 10 days at 30 Co , but it was 9 days at 32Co . The lowest minimum postoviposition was 4 days at 30 Co , whereas it was 7 days at 32 Co .

In the present study, the copulation period (this period was calculated from flies emergence to first copulation commenced), was lowest (5) days at 32 Co, but it was (6) days at 30 Co , whereas no mating was occurred in 24 Co , but Al-Misned (17) found that the period (3-4) days after adults emerged .

The flies do not lay eggs in winter (14) ; these results in agreement with our study , while Marchenko (9) found the ideal heat range is egg laying is 25 Co to 27 Co .

The longest preoviposition period was (13.6, 40.8 days) at 20 Co , whereas lowest was (12.6, 31.0 days) at 30 Co for species Ch. bezziana & Ch.megacephala respectively (18) , while Al-Minsed (17) calculated of these periods at 25 Co at 60-65-%R.H. : pre-oviposition (12.7) days, oviposition (17.7) days and post-ovposition (4.3) days .

Optimal temperature for egg deposition was 30 Co at which the female laid 226±10 egg, whereas the eggs laid at 32 Co (105) egg .There were no eggs laid at 24 Co (table 3). In the previous paper which related to another species; the optimal temperature to egg deposition was 25 Co (for Ch. bezziana & Ch.megacephala) (18), whereas Al-Minsed (17) reported that eggs laid (274.7) at 25 Co and 60-65% R.H. for Ch.albiceps .

Longevity was affected by temperature used, it was longest (14.42,15.15) days at 24Co, while it was lowest (8.42 , 10.0) days at 32 Co; it was (10.5 , 9.32) days at 30 Co for females and males respectively. The present results are in accordance with Al-Zubydi (18) . On the other hand the longevity (24.4, 23.6) days for females and males at 25 Co and 60-65-% R.H were respectively (17) , whereas Smit (14) assured that flies longevity 11 to 25 days in winter , the difference between previous studies with our study may be related to strain and rearing conditions.

In conclusion, we can say that fly is preffened warmer temperature. Generally, temperature 30 Co at 70%R.H. which was the optimum temperature suggested results.

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Table (1) :Incubation period, egg hatching, larval period and mortality of *Ch.albiceps* at constant temperature and 70%R.H.

Temp.(C°) (±1)	Egg stage		Larval stage	
	Incubation period (h.)	Egg hatching (%)	Larval period (days)	Larval mortality (%)
30	20±2	87.2±3.5	4.0±0.5	24.26±2.0
32	18±1	81.45±2.5	3.5±0.5	30.69±4.0

Table (2)Pupal period, mortality and sex-ratio of *Ch.albiceps* at constant temperature and 70%R.H.

Temp.(C°) (±1)	Pupal period (days)	Pupal mortality (%)	Sex-ratio (male : female)
25	6.0±0.5	61.88±4.5	4.32 : 1
30	5.0±0.5	25.13±4.0	1.8 : 1
32	4.5±0.5	6.28±1.5	1.3 : 1

Table (3): Minimum preoviposition , oviposition , minimum postoviposition period , egg number deposition and longevity of *Ch.albiceps* at laboratory temperature

Mean Temp.(C°) (±1)	minimum preoviposition period (days)	Oviposition Period (days)	Minimum postoviposition period (days)	Egg numbers	Longevity (days)	
					Males	Females
24	-	-	-	-	15.15	14.42
30	19.0±2.5	10.0±1.5	4.0±0.5	226±10	9.32	10.5
32	5.0±0.5	9.0±0.5	7.0±1.5	102±20	8.42	10.0

دراسة بعض الجوانب الحياتية و البيئية لذبابة *Chrsomya albiceps* (Wied.) (Diptera ;Calliphoridae)

رزاق شعلان عكل سهاد ياسين جاسم

الخلاصة:

درس تأثير درجات حرارة مختلفة على حياتية الذبابة المعدنية *Chrysomya albiceps* (Wied.) في المختبر ، اذ تم حساب مدة (حضانة البيض ، الدورين اليرقي و العذري) وهلاكاتهما بدرجات حرارة و رطوبة نسبية ثابتة . حيث وجد ان درجة الحرارة 30 مo برطوبة نسبية 70% هي الاكثر ملائمة لانتاج كثافة سكانية عالية لدوري البيضة و اليرقات ، بينما اظهرت النتائج ان 32 مo برطوبة نسبية 70% هي الاكثر ملائمة لدور العذراء .تأثرت النسبة الجنسية بدرجات الحرارة المستخدمة ، اذ وجد ان النسبة تميل الى الذكور بشدة بدرجة حرارة 25 مo ورطوبة نسبية 70% ، الا ان نسبة الذكور الى الإناث أخذت بالتقارب نسبيا بزيادة درجة الحرارة .نتائج تربية الكاملات في درجة حرارة المختبراظهرت ان الدرجة 24 م هي الاكثر ملائمة من حيث طول العمر للكاملات (الذكور و الاناث) على الرغم من ان الاناث لم تضع بيض ضمن هذه الدرجة ، بينما كانت الدرجة 30 م هي الدرجة المفضلة للكاملات من ناحية مدة وضع البيض وأعداد البيض الموضوعة .