Suitability of Dry and Semi-dry Date Fruit Varieties to the Almond Moth, *Ephestia Cautella* Walker (Lepidoptera: Pyralidae)

Nihal M. K. Bagy[1], Refaat A. Mohamed[1], Youssef A. Darwish[2] and Abdel-Wahab M. Ali[2]

[1]Plant Protection Research Institute, ARC, Egypt

[2]Plant Protection Department, Faculty of Agriculture, Assiut University

Abstract:

The almond moth, *Ephestia cautella* Walker is one of the most important pests of date fruits in storage in Egypt. The present study was conducted in the laboratory to evaluate the effect of two date varieties on the development and reproductive potential of *E. cautella*. The tested date varieties were Saidy (semi-dry) and Sakkoti (dry). Results indicated that the developmental duration of the immature stages (egg, larva and pupae) was 53.70±3.67 days on the dry- date; and 43.34±4.27 days on the semi-dry date. The survivorship during the period from egg to adult was 55.57% for the pest reared on the dry- date (Sakkoti); and 29.58% on the semi-dry (Saidy). The relatively higher index of efficacy of the pest (1.03) was observed on the dry-date, whereas the lowest (0.68) was recorded on the semi-dry date. Based on the results of life table statistics, the highest GRR, R_0, r_m and λ (35.48, 30.85, 0.0622 and 1.0637) occurred on the dry, whereas, the lowest (16.87, 14.62, 0.0603 and 1.0622) occurred on semi-dry. It seems that dry-date variety was highly favorable host for development and reproduction of the tested pest.

Keywords: Almond moth, Suitability, Date varieties

Received on: 30/10/2013 **Accepted for publication on:** 25/11 /2013

Referees: Prof. Jaber H. Abo Elhaggag Prof. Mostafa M.A. Rizk

Introduction:

The almond moth, *Ephestia cautella* Walker (Lepidoptera: Pyralidae) seriously damage dates quality in the field and storage in Egypt. The infestation begins in date palm plantations and continues in storehouse through infested dates and can go through multiple generations. In addition to date palm fruits, dried fig, raisin, flour, grains, cocoa and nuts were also reported as hosts of almond moth (Shahhosseini and Kamali, 1989; Hodges and Farrell, 2004 and Rees, 2007).

There is, however, little information on the suitability of date fruit varieties to the pest. Therefore, the present study was conducted to evaluate the suitability of some date fruit varieties to the almond moth. Results of this study will be useful to understand the mechanism of population build-up of *E. cautella* on commercial varieties of date palm fruits.

Materials and Methods:

The present investigation was carried out to study suitability of semi-dry (Saidy) and dry-date (Sakkoti) fruits (*Phoenix dactylifera* L.) to *E. cautella*. These varieties are most commercial semi and dry-date fruits in Egypt. All experiments oriented at constant temperature of 30±1°C, 60±5% RH and Photoperiod (16L: 8D).

***E. cautella* culture:**

Infested dry and semi-dry date palm fruits were collected from date palm plantations and traditional stores in the New Valley Governorate and transferred to the laboratory of Plant Protection Department, Faculty of Agriculture, Assiut University. Larvae collected from each variety were kept in glass jars 2 Kg with clean date fruits in each jar as a source of food until pupation. The pupae were transferred individually into glass vials (7 x 2 cm) and covered with muslin by means of rubber bands until the adult emergence. The emerged adults were transferred into oviposition cages measuring 30 x 30 x 35 cm at a rate of ten pairs of males and females / cage. Each cage consisted of wooden bottom and side, the other sides were made from a 2 mm wire mesh and the whole unit was covered with a wood plate. A cloth sleeve was fitted to the wooden side to enable handling the moths. Two cultures were prepared, one from semi-dry date fruits and another from dry-dates. The boxes were kept under laboratory conditions. The pest was reared for about five generations before the study was undertaken.

1-Adult stage:

Newly emerged adults (< 12 hrs old) were paired separately in small vials (7x2cm). Pieces of date fruits were introduced to each cage as oviposition site and adults were supplied daily with small droplets of honey. About 24 paris of adults were placed separately on semi-dry and another 15 pairs on dry date. Inspection was made daily to record the number of eggs laid by each female until the death of the female and the longevity was then recorded.

2- Egg stage:

Eggs were deposited singly inside the tubes, which were removed daily to separate Petri-dish. A number of 250 eggs in 5 replicates (50 eggs each) from both semi-dry and dry cultures were placed in an incubator at 30ºC and observed daily until hatching. Incubation period and hatchability were calculated.

3- Larval stage:

Larvae (< 24 hrs old) were distributed individually in glass tubes (10x2 cm) and provided with clean

date fruits. A number of 100 larvae in ten replicates from semi-dry and from dry date cultures were placed in an incubator at 30ºC. Larvae were checked daily up to pupation. The time required for the development and survival of the larvae was calculated.

4- Pupal stage:

Whenever the fully grown larvae began to pupate, they placed in an incubator at 30ºC, and observed daily until the adult emergence.

Statistical Analysis:

Data were subjected to statistical analysis using F-test and means were compared according to LSD values of significances at 0.05 level of probability.

Indices of Efficiency (IE) for development of the different stages of *E. cautella* were calculated according to the formula of Khattat and Stewart (1977):

Indices of Efficiency (IE) = S / T, where:

S is the percentage survival, T is the time required for development in days.

The obtained data were also used to calculate the following fecundity table aspects according to Birch (1948):

Gross reproductive rate (GRR). Net reproductive rate (R_0), Generation time (GT), Population doubling time (DT), Intrinsic rate of natural increase, (r_m) , and finite rate of increase (λ).

Results and Discussion:

The results indicate that the two date varieties permitted reasonable development of *E. cautella*. The duration, percentage of survival and Indices of Efficiency (IE) of the immature stages are given in Tables 1-3.

Egg Stage:

Data in Table (1) showed that the incubation period of the pest lasted 3.19±0.07 and 3.91±0.05 days on semi-dry and dry-date varieties, respectively (F=62.23). The highest percentage of hatchability was recorded in dry-variety (75.10%), whereas the lowest (50%) was recorded in semi-dry. The index of efficiency (IE) of egg stage was higher in dry-date (19.20) as compared with 15.67 in the semi-dry date (Table 3).

Larval Stage:

Table 1 show that the larval period was relatively short on semi-dry date (31.71 days) and relatively long (41.91 days) on dry-dates (Sakkoti). Statistical analysis showed significant differences between the tested two date varieties (F=62.67). The highest percentage of survival during larval stage (74%) was recorded for the larvae reared on dry variety; while the lowest (61.67%) was recorded for those reared on semi-dry variety. The Indices of Efficiency (IE) for larvae reared on semi-dry and dry-date varieties indicated that the index (1.94) was relatively higher in the larvae reared on semi-dry date as compared with (1.76) the dry-date.

Pupal Stage:

The duration of the pupal stage lasted 8.44±0.64 and 7.88±0.86 days when reared on semi-dry and dry-date, respectively. No significant difference was observed in pupal development between semi-dry and dry-date varieties (F=3.89). The highest percentage of pupal survival (100%) was noticed in dry-date, whereas the lowest (95.95%) was observed in semi-dry with no significant difference. The relatively higher IE (12.36) was obtained from dry- date variety, whereas the lower (11.36) was recorded from semi-dry date variety with no significant difference.

From Egg to Adult emergence:

As shown in Table (1) the total developmental period from egg to adult emergence was correlated significantly with the corresponding date palm fruit varieties (F=18.95). The longest time required for the pest to complete its life cycle (53.70±3.67 days) achieved on dry variety, while the shortest (43.34±4.27 days) was on semi-dry date. The highest percentage of survival (55.42%) and efficiency index (1.03) were observed on dry date, whereas, the lowest values (29.50% and 0.68) were noticed on semi-dry date. The foregoing results concerning, the duration, survival and index of efficiency in relation to date fruit varieties indicate that the dry variety (Sakkoti) was relatively preferable for development of the almond moth.

Adult Stage:

Data presented in Table (4) show the average length of the adult stage of the tested pest reared on semi-dry (Saidy) and dry (Sakkoti) fruits. It is clear that the pre-oviposition period was less than one day in all tested date varieties (F=0.59). The mean oviposition period ranged between 2.45 and 2.80 days for semi-dry and dry date, respectively (F=1.56). The post-ovipostion period was also less than one day in both date varieties (F=0.70). Regardless of the host plant the pre-reproductive period extended to the shortest time from the whole longevity of the adult stage (6.20%) while the oviposition period needed the longest time (81.39%), whereas the post-oviposition period extended only to 12.40% of the total adult longevity. It is clear also that adult emerged from dry-date (Sakkoti) survived longer than those emerged from semi-dry (Saidy).

The number of eggs / female reached 123.50 and 127.73 eggs for the pest emerged from semi-dry and dry-date, respectively (F=3.85). It seems that fecundity of *E. cautella* was relatively higher for the female emerged from dry-date variety. In general, based on the number of eggs laid per female of the almond moth, the dry-date variety is more suitable host than semi-dry date.

According to the longevity (male and females), as shown in Table 4. The shortest adult female longevity (2.91±1.02 days) was recorded in semi-dry whereas (F=18.59), the longest was recorded in dry-date (3.54±0.74 days). The shortest period was 2.29±0.99 days for males in semi-dry date and 3.47±1.31 days in the dry-date (F=10.09). The data generally show that the adult females and/or males tended to live longer on dry than on semi-dry date fruits.

Life table statistic parameters:

The calculated life table statistics of the almond moth are presented in Table 7.

The duration of one generation (GT) lasted for 44.44 and 55.53 days for the pest reared on semi-dry and dry-date varieties, respectively.

The population of this pest had the capacity to double (DT) every 11.48 and 11.22 days for the cohorts reared on semi-dry and dry-dates, respectively. Relatively short time for the population to double was recorded on dry-date variety (Sakkoti).

The number of females per female (m_x) was 16.87 in the pest reared on semi-dry fruits and was 35.48 on dry- date. These data revealed that the reproduction of *E. cautella* was relatively higher on dry dates than on semi-dry variety.

The values of net reproductive rate (R_0) indicate that *E. cautella* can

increase ca. 14.62 and 30.85 times after single generation for the pest reared on semi-dry and dry- date, respectively. It is clear that the population of this pest could increase about more than 2 times in the course of one generation when it reared on dry date as compared to that reared on semi-dry-date variety.

The value of r_m for the pest reared on the dry- date was relatively higher than that reared on semi-dry date variety. If r_m is a measure of the suitability of the host plant, then the maximum r_m reveals the most appropriate reproductive potential under those conditions. The data indicate that dry- date variety (Sakkoti) is the relatively more suitable for the pest than semi-dry variety (Saidy). When the values of the intrinsic rate of increase (r_m) were converted to the finite rate of increase (λ) according to Birch (1948), the population of the almond moth, *E. cautella* had the capacity to multiply about 1.062 and 1.064 females per female per day for the pest reared on semi-dry and dry-date, respectively.

From the above mentioned results, it could be concluded that the almond moth, *E. cautella*, developed successfully from egg to adult emergence on the two date varieties. The results show that the developmental time of the pre-adult stages of the pest was 43.34±4.27 days on the semi-dry date (Saidy) as compared with 53.70±3.67 days on dry-date variety. Johanson *et al.* (1992) demonstrated that the insect development is influenced by different abiotic and biotic factors such as temperature, relative humidity of food. The duration of the immature stages of the almond moth was found to be 42.54, 45.79, 51.48 and 50.41 days on Deryi, Zahedi, Piaron and Rabbi date varieties, respectively (Marouf *et al.* 2013). Akinneye and Ashamo (2009) found that the development of *E. cautella* was influenced by the diet on which they were reared. Similar results were obtained by Na and Ryoo (2000), who reported that the developmental rate of immature stages of *Plodia interpunctella* Hgr. (Pyralidae) increased at different rates on six dried vegetable commodities. However, Johanson *et al*. (1995) showed that the developmental rates and survival of *P. interpunctella* were much lower on dried fruits than on milled.

The present results also showed that the adult females and/or males lived longer on dry-date than on semi-dry date variety. Female longevity was 2.91 days on semi-dry date and was 3.54 days on dry-date. The life span of adult of *E. cautella* on milled maize has been reported to be nine days (Siruno and Morallo-Rejesus, 1986). Pre-oviposition period was found to be less than one day. This results are in general agreement with those of Marouf *et al*. (2013), they found that adults of the almond moth were ready to mate and oviposit immediately after emergence. Similar behavior has been observed on female of *Ephestia kuhniella* Zell. (Forouzan, 2003).

The data show that more eggs were laid by the moth reared on dry-date (127.50 eggs) compared with (123.50 eggs) on semi-dry date. However, eggs from moths reared on dry date were the most viable (75.10%), while those from moths reared on semi-dry dates were the least viable (50.00%). Marouf *et al*. (2013) found that total number of eggs per female ranged from 147.70 on Piaromto and 2456.29 eggs on Zabedi. They also reported that morphological and biochemical characteris-

tics of the date palm varieties might have affected the oviposition rate. Naseri *et al*. (2009) stated that feeding larvae of *Cadra cautella* on specific food source for several generations induce their adults to oviposit more on this specific type of food compared to other food source indicating adaptation of the adults to larval food source. It is a usual rule which, plant species differ greatly in suitability as hosts for specific insects when measured on terms of survival, development and reproductive rates of the pest. It is known that the quality and quantity of nourishment ingested by an insect can affect its survival and reproduction directly (Razmjou *et al*., 2006). Differences in developmental growth could be attributed to chemical (nutritional composition) or physical property of dates. The analysis of nutritional properties of the tested date varieties (Sakkoti and Saidy) indicated that dry date (Sakkoti) had a higher level of protein (3.66%) and fat (1.35%), as compared with semi-dry date (Saidy), which had relatively lower levels of protein (2.79%) and fat (1.29%) (Ramadan, 1995). This finding is in generally agreement with those of Vukajlavie and Pesie (2012), who found that protein and fat concentrations in caterpillar diet are the most important for Indian meal moth fecundity.

Marouf *et. al*. (2013) found that Degri and Zebedi varieties were the most suitable date palm varieties for *C. cautella*. They added that the highest percentage of mortality in immature stages, the highest sex ratio, and the highest development index (D.I.) were observed in those reared for Deyri variety, indicating that *C. cautella* can cause great damage for Deyri compared to offer dry and semi-dry date palm varieties of Iran.

The present study show that the value of the intrinsic rate of increase in dry date (Sakkoti) was nearly 1.02 times higher than that of pest reared on semi-dry variety. Application of life table in entomological researches has been increased in last decate (Feng *et al.*, 2009; Yin *et al.*, 2009; Hou and Weng, 2010). Gabre *et al*. (2005) stated that the intrinsic rate of increase (r_m) is a usual statistic for comparing the population growth potential of different species. Marouf *et. al*., 2013 found the highest r_m (0.105) and largest fecundity (95.80 offsprings) of *C. cautella* on Deyri varietiy. It is concluded that developmental time of the immature stages of *E. cautella* and adult fecundity are influenced by the date fruit variety on which they were reared and Sakkoti variety (dry-date) is the more suitable for *E. cautella* feeding than Saidy variety (semi-dry).

References:

Akinneye, J. O. And Ashamo, M. O. (2009). Evaluation of different dites for rearing coca moth, *Ephestia cautella* Walker (Lepidoptera: Pyralidae). Nig. J. Ent., (26):

Birch, L. C. (1948). The intrinsic rate of natural increase of an insect population. Journal of Animal Ecology, 17: 15-26.

Forouzan, M. (2003). Demography of Habrobracon hebetor Say (Hym.: Braconidae) on *Ephestia kuehniella* Zell. (Lep.: Pyralidae) and *Galleria mellonella* L. (Lep.: Pyralidae). MSc Dissertation, Gilan University, Rasht. 160 pp.

Feng, Y. T., Q. J. Wu, B. Y. Xu, S. L. Wang, X. L. Chang, W. Xie and Zhang, Y. J. (2009). Fitness costs and morphological change of laboratory-selected thiamethoxam resistance in the B-type *Bemisia tabaci* (Hemiptera: Aley-

rodidae). Journal of Applied Entomology, 133: 466-472.

Gabre, R. M., Adham, F. K. and Chi, H. (2005). Life table of *Chrysomya megacephala* (Fabricius) (Diptera: Calliphoridae). Acta Oecologia, 27: 179-183.

Hodges, R. and Farrell, G. (2004). Crop Post- Harvest, Science and Technology. Vol. 2, Blackwell Publishing Company, Oxford.

Hou, Y. M. and Weng, Z. Q. (2010). Temperature dependent development and life table parameters of *Octodonta nipae* (Coleoptera: Chrysomelidae). Environmental Entomology, 39 (5): 1676-1684.

Johnson, J.A.; Wofford, P.L. and Whitehand, L.C. (1992). Effect of diet and temperature on development rates, survival, and reproduction of the Indianmeal moth (Lepidoptera: Pyralidae). *J. Econ. Entomol.* 85, pp. 561–566.

Johnson, J.A.; Soderstrom, E.L.; Curtis, C.E. and Vail, P.V. (1995). Beyond methyl bromide: non-chemical control methods for post-harvest pests of walnuts. *Aust. Nutgrower*. 9, pp. 19–20.

Khattat, A. R. and Stewart, R. K. (1977). Development and survival of *Lygus lineolaris* exposed to different laboratory rearing conditions. Ann. Entomol. Soc. Amer., 70:274-278.

Marouf, A.; Amir-Maafi, M. and Shayesteh N. (2013). Two-sex life table analysis of population characteristics of almond moth, *Cadra cautella* (Lepidoptera: Pyralidae) on dry and semi-dry date palm varieties. J. Crop Prot. 2013, 2 (2): 171-181.

Na, Ja Hyun and Ryoo, Mun Il (2000)' The influence of temperature on development of *Plodia interpunctella* (Lepidoptera: Pyralidae) on dried vegetable commodities. Journal of Stored Products Research, 36, (2): 125-129.

Naseri, B., Fathipour, Y., Moharramipour, S. and Hosseininaveh, V. (2009). Comparative life history and fecundity of *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae) on different soybean varieties. Entomological Science, 12: 147-154.

Ramadan, B. R. (1995). Biochemical, nutritional and technological studies on dates. Ph. D. Thesis, Assiut University, 199 pp.

Razmjou, J., Moharramipour, S., Fathipour, Y. and Mirhoseini, S.Z. (2006). Effect of cotton cultivar on performance of *Aphis gossipii* (Homoptera: Aphididae) in Iran. J. Econ. Entomol., 99: 1820-1825.

Rees, D. 2007. Insects of Stored Grain. CSIRO Publishing, Canberra. 80pp.

Shahhosseini, M. J. and Kamali, K. (1989). A checklist of insects, mites and rodents affecting stored products in Iran. J. Entomol. Soc. of Iran, Suppl. 5, pp. 27.

Siruno, Z. T. and Morallo-Rejesus, B. (1986). Biology of *Ephestia cautella* (Walker) on corn and its comparative development on other stored products. Philippine Entomologist, 6 (5): 471-476.

Vukajlavie, F. N. and Pesie, S. B. (2012). Contribution to the studies of the Indian meal moth, *Plodia interpanctella* Hbn. (Lepdoptera: Pyralidae) fecundity depending on diet type. Kvagujeac J. Sci., 34:107-115.

Yin, X. H., Wu, Q. J., Li, X. F., Zhang, Y. J. and Xu, B. Y. (2009). Demographic changes in multigeneration *Plutella xylostella*(Lepidoptera:Plutellidae) after exposure to sublethal concentrations of spinosad. J. Econ. Entomol., 102 (1): 357-365.

Table (1): Duration of the immature stages (in days ± SD) of *E. cautella* on semi-dry and dry- date fruits.

Date variety	Duration (in days) ± SD			
	Egg	Larva	Pupa	Egg to adult
Semi-dry	3.19±0.07 b	31.71±3.56 b	8.44±0.64 a	43.34±4.27 b
Dry	3.91±0.05 a	41.91±2.76 a	7.88±0.86 a	53.70±3.67 a
F. values	62.23	62.67	3.89	18.95
Significant	<0.05	<0.05	0.06	<0.05
LSD at 5%	0.22	2.88	NS	5.48

Means with the same letter(s) in each column are not significantly different at P> 0.05.

Table (2): Mean (±SD) successive percentage survival of developmental stages of E. *cautella* on semi-dry and dry- date.

Date variety	Survival (%) ± SD							
	Egg		Larvae		Pupae		Mean	
	(n)*	Mean	(n)	Mean	(n)	Mean	(n)	Mean
Semi-dry	250	50.00±2.19 b	120	61.67±18.99 b	74	95.94±9.63 a	444	29.50±10.27 b
Dry	250	75.10±14.35 a	100	74.00±16.46 a	74	100.00±0.00 a	424	55.42±10.27 a

Means with the same letters in each column are not significantly different at P>0.05.

*Numbers in parentheses are the number of samples tested.

Table (3): Index of efficacy (IE) of the developmental stages of E. *cautella* on semi-dry and dry- date fruits.

Date variety	Index of efficacy (IE)			
	Egg	Larvae	Pupae	Egg to adult
Semi-dry	15.67	1.94	11.36	0.68
Dry	19.21	1.76	12.69	1.03

Table (4): Longevity and fecundity of E. *cautella* reared on semi-dry and dry- date fruits.

Date variety	Longevity (in days) and fecundity ± SD					
	Male	Female				
		Oviposition periods			Longevity	No. eggs / ♀
		Pre-	Oviposition	Post-		
Semi-dry	2.29±0.99 b	0.13±0.34 a	2.45±0.80 a	0.33±0.49 a	2.91±1.02 b	123.50±61.71 a
Dry	3.47±1.31 a	0.27±0.79 a	2.80±0.86 a	0.47±0.52 a	3.54±0.74 a	127.73±57.03 a
F. values	10.09	0.59	1.56	0.70	18.59	3.85
Significant	<0.05	0.42	0.14	0.41	<0.05	0.84
LSD at 5%	0.76	NS	NS	NS	0.62	NS

Means with the same letters in each column are not significantly different at P>0.05.

Table (5): Age-specific survival rate (l_x) and age-specific fecundity rate (m_x) of *E. cautella* reared on semi-dry dates.

Age (days) x	Observations (n)	Survival (l_x)	♀/♀/days (m_x)* (GRR)	$l_x.m_x$ (R_0)**	$l_x.m_x.x$
(0-43)	Immature stages				
44	24	1.00	9.29	9.29	408.77
45	19	0.79	5.08	4.01	180.45
46	13	0.54	2.43	1.31	60.26
47	2	0.08	0.07	0.01	0.29
48	0	0.00	0.00	0.00	0.00
Total			(GRR) 16.87	(R_0)14.62	649.77

* Adjusted for adult emergence and sex ratio 0.51:0.49.

** (R_0) Net reproductive rate.

Table (6): Age-specific survival rate (l_x) and age-specific fecundity rate (m_x) of *E. cautella* reared on dry dates.

Age (days) x	Observations (n)	Survival (l_x)	♀/♀/days (m_x)* (GRR)	$l_x.m_x$ (R_0)**	$l_x.m_x.x$
(0-54)	Immature stages				
55	15	1.00	19.29	19.29	1061.36
56	12	0.80	9.89	7.91	442.96
57	10	0.66	4.37	2.88	164.16
58	6	0.40	1.93	0.77	44.69
59	2	0.13	0.00	0.00	0.00
Total			(GRR) 35.48	(R_0) 30.85	1713.17

* Adjusted for adult emergence and sex ratio 0.51:0.49.

** (R_0) Net reproductive rate.

Table (7): Age-specific survival rate (L_x) and age-specific fecundity rate (m_x) of *E. cautella* reared on semi and dry dates.

Date variety	Generation time (GT)	Doubling time (DT)	Gross reproductive rate (GRR)	Net reproductive rate (R_0)	Rate of increase	
					Intrinsic (r_m)	Finite λ
Semi-dry	44.44	11.48	16.87	14.62	0.06035	1.0622
Dry	55.53	11.22	35.48	30.85	0.06179	1.0637

ملائمة ثمار بعض أصناف البلح لحشرة دودة البلح العمري

نهال مجدي محمد خليل باجى[1]، رفعت عبد الشافي محمد[1]، يوسف عوض درويش[2]، عبد الوهاب محمد على[2]

[1]معهد بحوث وقاية النباتات – مركز البحوث الزراعية

[2]قسم وقاية النبات – كلية الزراعة – جامعة أسيوط

الملخص:

تعتبر حشرة دودة البلح العمري من أهم الآفات التي تصيب ثمار البلح في المخـــزن فـــي مصر. أجريت هذه الدراسة بهدف معرفة تأثير ثمار بعض أصناف البلح على النمـــو والاقتـــدار التناسلي لهذه الآفة تحت الظروف المعملية. استخدم الصنف (صعيدي) كمثال للأصناف النصف جافة واستخدم الصنف السكوتى كمثال للأصناف الجافة. أوضحت النتائج أن طول فتـــرة النمـــو للأطوار الغير كاملة (البيضة ، اليرقة ، العذراء) استغرقت حوالي 53 يوما عند تربية الحـــشرة على الصنف الجاف (سكوتى) ، بينما استغرقت نفس هذه الفترة 43 يوما عند تربية الحشرة على الصنف نصف الجاف (صعيدي). كانت نسبة الإعاشة للأطوار الغير كاملة 55.57% عند تربية الحشرة على الصنف الجاف في حين كانت نسبة الإعاشة للأطوار الغير كاملـــة 29.58% عنـــد تربية الحشرة على الصنف النصف جاف.

أوضحت النتائج أيضا أن دليل الفعالية كان عاليا للحشرات المرباة على الـــصنف الجـــاف بينما كان منخفضا عند تربية الحشرة على الصنف النصف جاف.

باستخدام مقاييس جداول الحياة وجد أن كل من معـــدل التـــضاعف، ومعـــدلات الزيـــادة الحقيقية والنهائية لهذه الآفة كانت عالية للحشرات المرباة على الصنف الجاف بينما كانـــت اقـــل في حالة تربية الحشرة على الصنف النصف جاف.

اتضح من هذه الدراسة أن هذه الآفة تفضل أصناف البلح الجافة عـــن مثيلاتهـــا النـــصف جافة.