

INFESTATION POTENTIAL OF *EPHESTIA CAUTELLA* (WLK.) AND *EPESTIA CALIDELLA* (GUEN.) ON CERTAIN EGYPTIAN DATE VARIETIES

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Abstract

Laboratory studies were conducted to evaluate the susceptibility rates of seven date varieties (Aamry, Frihi, Partamoda, Kakaa, Malakaby and Sakkoti) to infestation by *Ephestia cautella* (WLK.) and *Ephestia calidella* (Guen.). Therefore, susceptibility index "SI" was determined by recording some biological parameters including fecundity, mean developmental period and food consumption. The obtained results could be categorized into three main groups. The first includes El-Aamry variety which has high SI values of 3.74 and 3.72 for both *Ephestia cautella* and *E. calidella*, respectively. Such tested insects consumed more quantities from this variety and in turn gave more progeny with short developmental periods.

The second comprises both, Frihi, Partamouda, Kakaa and Malakaby varieties which have the lowest SI values ranging from 1.93 to 2.44 for both examined insects. These insects consumed lower quantities from both date varieties and consequently produced fewer progeny with longer growth durations.

The third group includes Saidi and Sakkoti varieties the rest date varieties which have intermediate SI values.

Finally, it is clear that there is no completely immune variety and we need other complementary approaches for protecting stored dates

INTRODUCTION

Date palm (*Phoenix dactylifera* L.) is one of the oldest and important cultivated fruits in the world. The Middle East is the primary date growing region in the world . It is also the largest consumer of dates especially Arab countries, which consume large quantities during the fasting month of Ramadan . About 70% of the world production is produced by Egypt, Iraq, Saudi Arabia, Iran, Pakistan and Algeria (FAO, 1997) . Egypt produced the largest quantity in Arab world, where the annual production reached 906 thousand tons. Nearly 21.5% from this amount is dry date varieties (AECA, 2000) .

Also, Al – Assal (2004) reported that date palm plantation represented by more than 13 million trees producing about one million tons of fresh, semi – dry and dry fruits each year .

On the other hand, the Oasis date moth and almond moth are major pests of date fruits pre and post harvest which cause high economical loss. The oases date

moth, *Ephestia calidella* (Guen.) is considered a serious pest infesting date both in the field and in stores. The pest cause huge losses and qualitative damage of date, Abdel Meguid, et al. (2005). The aim of this investigation is to measure the ability of date fruit varieties mentioned before, to be infested by the Oasis date moth, *Ephestia calidella* (Guen) and almond moth, *Ephestia cautella* (WLK)

MATERIALS AND METHODS

- 1- **Sampling** : Two varieties of semi dry date fruits (Aamry, Saidi cultivars), five varieties of dry date fruits (Sakkoti / Malakaby Partamouda / kaka / Frihi types), were tested in this study. Sakkoti, Malakaby and Partamoda cultivars were obtained from Aswan Governorate. Saidi, Frihi and kaka cultivars were obtained from El-Bahria Oasis region and Aamry only was from Sharkia Governorate . Different samples of date fruit, were sterilized before using by continuous freezing (-10°C) for at least two months and then kept at the experimental conditions for 12h. before starting the work .
- 2- **Stock culture of the test insects** : A culture of the *Ephestia calidella* and *E. cautella* were obtained from the infested dates and reared in the Stored Grain Res. Dept., Plant Protection Res. Institute on dry uninfested dates . The culture was maintained at $26 \pm 0.5^{\circ}\text{C}$ and $60 \pm 5\%$ R.H.
- 3- **Susceptibility of different date varieties to infestation** : determine the relative susceptibility of seven date fruit varieties to infestation with *Ephestia calidella* and *E.cautella*. Plastic dishes divided in to 7 sections. About 24-30 g (3-5 fruits) of each variety was put in betri dish (9 cm diam) and introduced as separate compartment in plastic dish (32 cm in diameter and 13 cm in depth) which used as choice chambers (**Koura and El – Halfawy, 1967, Mahgoub, 1987 and El – Degwi, 1990**). Fourteen pairs of adult test insects 0-1 day old were placed inside plastic dish. The dish was covered with muslin and maintained in the incubator for 48h. under controlled conditions mentioned before, then the adults were removed and each variety of date fruits was transferred to a glass jars kept under the experimental conditions. Eggs were counted on each variety and recorded. After one month, the glass jars were daily inspected for adult emergence. The date of the first adult emergence and counting was recorded until no adult emergence . The developmental period was estimated from the time of egg laying up to adult emergence from date fruits. Also, when adult emergence ceased the sample reweighed again to record the damage expressed as wet weight loss.
- 4- **Determination of susceptibility**: Determination of susceptibility of the tested variety was conducted by calculating the suitability of each variety to

insect development according to the method **described by Dobie (1974)** and known as susceptibility Index

5- (SI) as follow :

$$SI = \frac{\log S}{T} \times 100$$

Where, S = number of emerged adults / number of eggs

T = developmental period in days .

At the end of the experiments date fruits were weighted and the weight loss for each variety was calculated .

RESULTS AND DISCUSSION

Susceptibility of seven date varieties to *E. calidella* and *E.cautella* infestation are shown in table 1 and 2. The oviposition preference of the two moths reared on seven date varieties showed significant variation between varieties in *E.calidella*, meanwhile there were significant differences in *E.cautella* (Table 2) which showed that, Frihi date variety was the most preferred variety for oviposition, since the mean number of eggs laying was 280 eggs, meanwhile, Saidi date variety was the least preferred variety (172.67 eggs).

Data compiled in Table (1) and (2) revealed also that the differences between developmental period (MDP) of larval and pupal stages of newly hatched larvae fed on different hosts proved to be statistically significant. The longest (MDP) was on Sakkoti date variety which averaged 48.67 & 46.67 days for *E.calidella* and *E.cautella* respectively. Similar results were obtained by El saedy and Abd El –Salam, (1983) who stated that *E.cautella* larvae fed on different date varieties lived for different durations according to the kind of larval food.

Percentage of adult emergence of *E.calidella* are non significant values, meanwhile, in case of *E. cautella*, the values were statistically significant, Saidi variety produced lower emergency (7.2% adults), while, Aamry variety gave the highest percentage of emergency (12.53% adults). Regarding to the susceptibility index (SI) there is significant difference between date varieties. The differences between Aamry variety and Saidi variety was significant, while the other varieties, there was no significant variation between them (Table 1). The susceptibility Index varied greatly from 1.27 for Sakkoti variety to 2.5 for Aamry variety, which was due to differences to the percentage of emerged adults (Table 2). Table 1 and 2 revealed also that, the susceptible variety gave a sharp reduction in weight loss able to infestation by *E. calidella* and *E. cautella*. The susceptible variety Aamry) gave 42.77% and 28.27% weigh loss for *E.calidella* and *E. cautella*, respectively.

The study indicated that there was a direct relation between the susceptibility of the variety and the number of adult developed and weight loss. These results agree with Khokhar and Gupta, (1974) which proved that more adults developed on the susceptible variety.

These results confirm with obtained by Eman Attia, (2003) who found that *E. calidella* larvae reared on 15 different dry food including dry fruits were greatly differed according to kind of larval food. Also, stated that the percentages of larval survival, adult emergence were insignificantly affected by the different foods. Ali, et al (2001/2002) who stated that the insects, *A. sabella*, *B. amydraula*, *C. dactyliperda*, *E. calidella*, *Deudorix livia* and *Carpophilus Spp.* were caused 20- 73 % loss of tamr annually. Hussain and Ali (1995) who reported that the highest mean of food consumed occurred at the highest density (20 larvae) in dates without tepals. Ali, et al (2003) who stated that ability of semi-dry and dry dates to insect infestation in stores and percentages of dates infestation averaged 52.1 , 44.2 and 44.8 % for saidi, kakea and frihi dates , respectively.

Finally, there was a wide range of susceptibility in the tested varieties to two moth infestation. Some varieties (Sakkoti, Saidi, Malakaby and Partamouda) retarded insect development by prolonging development while others (Aamry, Frihi and Kaka) shortened developmental periods. It is clear from the obtained findings that there is no completely immune variety, and accordingly, application of other safe complementary approaches to protect our dates stocks produced yearly should be considered.

Table 1. Susceptibility of seven date fruit cultivars to infestation with the *Ephestia calidella* (Guen)

Varieties	Mean eggs No.	MDP (days)	Adult emergence (%)	Suscept. Index (SI)	Weight loss (%)
Aamry	230 a	40.33 c	12.53 a	2.64 a	42.77 a
Frihi	240 a	40.33 c	9.93 a	2.44 ab	36.03 ab
Partamouda	213.67 a	44.67 abc	10.65 a	2.23 ab	16.35 c
Kakaa	173.33 a	43.33 bc	12.39 a	2.43 ab	27.34 abc
Malakaby	193.67 a	48 ab	8.76 a	1.93 ab	34.87 ab
Saidi	231.33 a	49.17 a	7.2 a	1.66 b	14.19 c
Sakkoti	160.67 a	48.67 a	8.53 a	1.86 ab	20.93 bc
F. value	NS	**	NS	*	*
LSD 5%	162.606	4.819	7.953	0.797	16.74

Data was analyzed statistically by analysis of variance and means separated by Duncan multiple range test. - Different symbols after standard error indicates a significant difference .

Table 2. Susceptibility of seven date fruit cultivars to infestation with the *Ephestia cautella* (WLK)

Varieties	Mean eggs No.	MDP (days)	Adult emergence (%)	Suscept. Index (SI)	Weight loss (%)
Aamry	278 a	37.67 c	8.77 ab	2.5 a	28.27 a
Frihi	280 a	38.33 c	8.53 ab	2.42 a	26.19 a
Partamouda	214 ab	43.33 b	9.69 a	2.27 ab	15.37 ab
Kakaa	192.33 ab	41.33 b	8.74 ab	2.27 ab	15.23 ab
Malakaby	260 ab	43.67 b	6.44 bc	1.85 b	18.19 ab
Saidi	172.67 b	43.33 b	7.71 ab	2.03 ab	18.77 ab
Sakkoti	275.33 a	46.67 a	4.41 c	1.27 c	7.45 b
F. value	*	***	*	***	*
LSD 5 %	89.847	2.325	2.87	0.458	11.977

Data was analyzed statistically by analysis of variance and means separated by Duncan multiple range test. – Different symbols after standard error indicates a significant difference .

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درجات الإصابة بحشرتي فراشة البلح العامري وفراشة بلح الواحات علي بعض أصناف البلح المصرية

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في هذه الدراسة تم اختبار وتقدير حساسية سبعة أصناف من محصول البلح المصري للإصابة بحشرتين من أهم واطغر فراشات البلح التي تصيب المحصول داخل المخازن وقبل تخزينه أثناء وجوده في المنشر وهما فراشة دودة البلح العامري وفراشة بلح الواحات وقد تم الاختبار وتقدير الحساسية بطريقة الاختبار الحر (التفضيل) حيث تم في الدراسة تحديد سلوك ونمو الحشرتين بتقدير العديد من الصفات البيولوجية للحشرتين علي ثمار كل صنف مختبر مثل عدد البيض الكلي الموضوع ومتوسط فترة التكوين أو التطور وكذلك حساب كل من قيم دليل الحساسية ونسبة الفقد في الوزن بعد الإصابة علي أساس الوزن الجاف عند ظروف معملية من حرارة 26 ± 5 درجة مئوية ورطوبة نسبية 60 ± 5 % .

وقد أظهرت النتائج أن كل الأصناف المختبرة كانت حساسة للإصابة بكلي الحشرتين بدرجات متفاوتة ولم يتواجد أي صنف منيع تماما للإصابة بأي من الحشرتين . حيث أظهرت قيم دليل الحساسية لمعظم الأصناف المختبرة شدة حساسيتها للإصابة بفراشة *E. cautella* بدرجة اكبر من فراشة *E. calidella* . أما نسبة الفقد في الوزن فوجد أن كل الأصناف المختبرة حدث لها فقد في الوزن بدرجات متفاوتة وكان صنف السكوتي والصعيدى اقل الأصناف فقدا بينما كان صنف العامري من اكثر الأصناف فقدا في الوزن

وتوصي الدراسة الحالية بعمل دراسات أخرى واستخدام طرق تكميلية أخرى لحفظ المخزون القومي من محصول البلح بطريقة آمنة.