

SUSCEPTIBILITY OF DATE PALM FRUIT CULTIVARS TO THE NATURAL INFESTATION BY *OLIGONYCHUS AFRASIATICUS* (MCG.) (ACARI: TETRANYCHIDAE) IN RELATION TO THEIR CHEMICAL COMPOSITION

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ABSTRACT :

The susceptibility of date palm fruits of six cultivars (Sokary, Rothan, Moonifie, Sefrie, Cebiky and Khodary) to natural infestation by the *Oligonychus afrasiaticus* (Mcg.) and the effect of their qualitative and chemical composition on infestation, were studied at Riyadh region in two inspection date, on May 15th and the second after forty days in season 2004. Results indicated that date fruit cultivars (Sokary and Rothan) appeared as highly susceptible (H.S.). However, cultivar of Cebiky seemed as resistant (R), while the cultivar of Khodary appeared as moderate resistant (MR) to the infestation by this mite species. Also, the results indicated that differences between the date mite infestation and date fruit contents of different cultivars (lipids, proteins, carbohydrates and ash), were insignificant. Besides, the results showed significant negative correlation between infestation and carbohydrate content of date fruits (amounts of sucrose, glucose, fructose, fats and ash). However, significant positive correlation was found between infestation and proteins content.

INTRODUCTION:

The "Date or Dust Mite" *Oligonychus afrasiaticus* (fam.: Tetranychidae) is an important pest of the date palm, particularly in fruit stage and renders the crop totality unmarketable in heavy-infestation areas. It attacks the dates from their early stages of development, spinning its webs around the date bunches and multiplies in big numbers. Dust collects in the webs plus the exuviae of the different development stages of the mite making the date bunches look dusty. It feeds on the juices that sucks from the dates, rendering them

unfit for human consumption. In Iraq, Dawson and Pansiot (1965) and Gharib (1976) stated that the mite, *Paratetranychus afrasiaticus* Mcg. infested date fruits and that inflicted serious damage on the quality of dates. Saleh and Hosny (1979) in Egypt, noticed that *Oligonychus* spp. were the common acari pests of date palms in Kharga Oasis. Kadjbaf and Kamali (1993) in Iran, reported that the old world mite, *O. afrasiaticus* was a serious pest of dates in Khuzestan. Also, Palevsky *et al.* (2004) in Israel, found that the date mite, *O. afrasiaticus* was the dominant spider mite pest of date fruits in the

Southern Arava Valley. In Saudi Arabia, Al-Jabr *et al.* (2001) revealed that the spider mite, *Tetranychus* sp. and the dust mite, *O. afrasiaticus* were the most abundant mite species which infested the bunches and leaflets of the tested date palm cultivars.

Thus, the present work aims to evaluate the susceptibility degrees of date fruits of certain date palm cultivars to the natural infestation by *O. afrasiaticus* at Riyadh region, Saudi Arabia, in relation to their chemical compositions (fats, proteins, carbohydrates and ash).

MATERIALS AND METHODS:

Studies were conducted at Riyadh region, Saudi Arabia, in two inspection dates. The first was on May 15th., and the second after forty days in 2004 season. A sample of one hundred of date fruits from each of the six cultivars (Sokary, Rothan, Moonifie, Sefrie, Cebiky and Khodary) was selected, at random, and left throughout the season, without applying any pest control measures. The mite individuals were removed by fine brush onto glass sheet and counted using a binocular. The percent of infestation for each date fruit cultivar was estimated.

Classification of the tested date palm fruit cultivars to their susceptibility degrees was adopted as described by (Semeada, 1985 and Nossier, 1996), based on a quantitative approach found to the following assumptions:

A-Cultivars were grouped into five categories; i.e. resistant (R), moderate resistant (MR), relative resistant (RR), susceptible (S), and highly susceptible (HS).

B-General mean infestation = mean number of individuals (MN)/one hundred date fruits were considered as the standard for classification. Range of change (RC) between the maximum mean number values for the

cultivars was calculated by applying the following equation:

$$RC = MN_{mx} - MN_{mn}$$

where: MN_{mx} = maximum number of individuals/cultivars, MN_{mn} =minimum number of individuals/ cultivars.

C-Unit change in cultivars (UC) was the amount of change in cultivars from one degree of resistance or susceptibility to the preceding degree (from MR to R or from MR to RR ... etc).

According to the above mentioned equation, the tested cultivars could be classified as the follows:

- 1-The highly susceptible group (HS): cultivars with infestation more than $(MN+ UC)$.
- 2-The susceptible group (S): cultivars with infestation ranging from MN to $(MN+UC)$.
- 3-The relative resistant group (RR): cultivars with infestation less than MN to $(MN-UC)$.
- 4-The moderate resistant group (MR): cultivars with infestation ranging from $<(MN-UC)$ to $(MN-2UC)$.
- 5-The resistant group (R): cultivars with infestation less than $(MN- 2UC)$.

Extensive work was carried out to determine the relationship between date contents (lipid, proteins, carbohydrates and ash) and natural infestation by date mite. Analysis of date contents was carried out according to (A.O.A.C., 1965).

RESULTS AND DISCUSSION:

A-Susceptibility of date fruits of different cultivars to the natural infestation by date mite:

First inspection date (May, 15th): Statistical analysis of the data (Table 1) reveal highly significant differences among date fruit cultivars respecting average numbers of date

mite. The date fruit cultivar of Rothan harboured the highest number of *O. afrasiaticus* with an average of 13.6 mites/100 date fruits. However, the lowest number was recorded on date fruit cultivar of Cebiky (8.1 mite individuals/100 date fruits).

Second inspection date (June, 24th): Data in Table (1) show highly significant difference among date fruit cultivars. The highest number of *O. afrasiaticus* was appeared on date fruits cultivar of Sokary with an average of 10.6 mite individuals/100 date fruits. However, the lowest number was recorded on the date fruit cultivar of Cebiky (5.6 mite individuals/100 date fruits). The mean of results in first and second inspection dates were summarized also in Table (1). Statistical analysis of the data reveal highly significant differences among date fruits cultivars. The susceptibility degree of each date cultivar to this mite species was determined by the previously mentioned formula. The date fruit cultivars Sokary and Rothan occupied the highest number of *O. afrasiaticus* with an average of 10.6 and 9.7 mites/100 date fruits, respectively. These two cultivars appeared as highly susceptible fruit cultivar (H.S.). However, the lowest number was recorded on the data fruit cultivar of Cebiky with an average of 6.85 mites/100 date fruits. This cultivar appeared as resistant cultivar (R). Al-Jabr *et al.* (2001) revealed that the spider mite, *Tetranychus* sp. And dust mite, *O. afrasiaticus* were the most abundant mite species, which infested palm cultivars (Kelas, Garr and Helaly) in Al-Hassa oasis during (Jun.-Aug.).

B-Relationship between date fruit contents of different cultivars (lipids, proteins, carbohydrates and ash) and the infestation by date mite:

Lipids and proteins: occur in small amounts in the date flesh.

Fats: mainly concentrated in the skin and has a more physiological importance in the protection of the fruit than contributing to the nutritional value of the date flesh (Morton, 1987). Data in Table (2) show insignificant differences among the tested date cultivars regarding of infestation by the date mite, *O. afrasiaticus*.

Proteins: Proteins occur in date fruit though their amino acid pattern is favourable to human needs, the amounts are too small. Data in Table (2) show significant differences concerning of content of proteins, Cebiky and Moonifie had the highest content of proteins (3.95% and 3.34%). The lowest levels were recorded on the cultivars of Rothan and Sefrie (2.76% and 2.59%).

Carbohydrates: Sugars contribute the most prevalent single component, and in the ancient date production countries, the date has been used more as a sugar source than as a fruit. All sugars in dates consist of a mixture of sucrose, glucose and fructose (Barreveld, 1993). Data (Table 2) revealed that the date fruit cultivar could be arranged in descending order according to their carbohydrate contents as follows: Sokary, Cebiky, Moonifie, Khodary, Rothan and Sefrie.

Ash: Data (Table 2) indicated that the differences among the tested date fruits, appertained the ash content, were only significant between Rothan or Sokary and Khodary or Cebiky.

Generally, from the forementioned results (Table 2) it could be concluded that in consequence of the high levels of proteins, the moderate levels of lipids and carbohydrates, and the low levels of ash of some date fruit cultivars, certain degrees of resistance (RR, MR,

R) were manifested towards the date mite infestation.

C-Regression equations and simple correlations between each chemical composition of date fruits and infestation by date mite:

Data in Table (3) show significant negative correlation between infestation and carbohydrates content (amounts of sucrose, glucose and fructose). Also, significant negative correlation was found between infestation and proteins content. Clifford *et al.* (1998) reported that accumulation of total amino acids was acceptable for feeding some insect larvae. This accumulation of amino acids may play a role in

increasing infestation. Saleh *et al.* (2002) found that the relationship between infestation by *Oryzaephilus surinamensis* (L.) and protein content was significantly positive. However, insignificant negative correlation was found between infestation and amount of ash. Ash are usually connected with the insoluble, non-nutritive protein of the date flesh. Mainly composed of cellulose, hemicellulose, lignins, lingo-cellulose, and insoluble proteins.

Finally, the date mite infesting date fruits spins the fine web, which collects dust, and with heavy infestation the colour of branches turns black. Heavily infested dates are unmarketable and rejected as human food.

Table (1): Average numbers of *O. afrasiaticus*/100 date fruits and the susceptibility degrees of different date palm fruit cultivars, Riyadh region, Saudi Arabia, 2005 season.

No	Cultivar	*Average numbers and susceptibility degrees		
		1 st . inspection	2 nd . Inspection	($\bar{X} \pm SD$)
1	Sokary	11.9±1.2942 ab (S)	10.6±1.2942 a (HS)	11.25±2.4749 a (HS)
2	Rothan	13.6±0.74162 a (HS)	9.7±1.5248 a (HS)	11.65±1.6047 a (HS)
3	Moonifie	10.2±1.3038 bc (HS)	7.5±1.3693 bc (MR)	8.85±2.3076 b (RR)
4	Sefrie	11.7±1.8235 b (RR)	9.0±1.8708 ab (HS)	10.35±3.1544 a (HS)
5	Cebiky	8.1±1.5572 d (R)	5.6±0.9618 d (R)	6.85±1.5166 c (R)
6	Khodary	9.1±1.58114 cd (MR)	7.0±1.1726 cd (MR)	8.05±2.31841 bc (MR)
Mean		10.75	8.23	9.46

* Mean followed by the same letter(s), within each column, are not significantly different at 0.05% level of probability.

Table (2): Average numbers of date mite, *O. afrasiaticus* on different cultivars of date fruits in relation to lipids, proteins, carbohydrates and ash.

No	Cultivar	Mean of infestation ± SD	Content %			
			Lipids	Proteins	Carbohydrates	Ash
1	Sokary	11.25±2.4749 a	0.068±0.01 cd	3.26±0.05 b	88.01±0.61 a	1.57±0.05 c
2	Rothan	11.65±1.6047 a	0.105±0.02 a	2.76±0.19 c	76.73±1.85 d	1.87±0.05 abc
3	Moonifie	8.85±2.3076 b	0.110±0.01 a	3.34±0.31 b	82.37±0.20 c	1.77±0.25 abc
4	Sefrie	10.35±3.1544 a	0.070±0.01 cd	2.59±0.01 c	76.48±0.46 d	1.93±0.05 ab
5	Cebiky	6.65±1.5166 c	0.097±0.01 a	3.95±0.57 a	85.54±0.46 b	2.03±0.28 a

6	Khodary	8.00±2.31841 bc	0.078±0.01 c	3.27±0.41 b	81.31±0.76 c	1.57±0.218 c
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Table (3):Regression equations and simple correlation coefficient between each chemical composition of date fruits and infestation by *O. afrasiaticus*.

Composition	Regression equation	Correlation coef.
Ash	Y= 1.996+ (-0.01086) x	-0.219
Lipids	Y= 0.1037+ (-0.00102) x	-0.213
Proteins	Y= 5.04+ (-0.975) x	-0.78*
Carbohydrates	Y= 89.12+ (-0.3891) x	-0.322*

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حساسية بعض أصناف ثمار التمور للإصابة الطبيعية بحلم الغبار
***Oligonychus afrasiaticus* (Mcg)**
وعلاقتها بمكوناتها الكيميائية

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قدرت حساسية 6 أنواع من ثمار تمور النخيل، وهي (السكري، روثان، منيفي، صفري، سبكي، خضري)، للإصابة الطبيعية بواسطة حلم الغبار *Oligonychus afrasiaticus* (Mcg) وتأثير المكونات الغذائية للأصناف المختلفة على نسبة الإصابة في منطقة الخرج، الرياض - بالمملكة العربية السعودية موسم 2004. أظهرت النتائج التي أخذت في فترتين الأولى في 15 مايو والثانية بعد 40 يوماً من الأولى أن ثمار صنفى (سكري وروثان) أظهرت حساسية عالية للإصابة (H.S.) بينما أظهر صنف (سبكي) مقاومة عالية للإصابة (R)، وأظهر صنف (سبكي) مقاومة متوسطة للإصابة (MR). وأوضحت النتائج أن العلاقة بين المحتويات الكيماوية الأصناف المختلفة للتمور (الدهون، البروتين، السكريات، الرماد)، ونسبة الإصابة غير معنوية. كما أوضح نتائج التحليل الإحصائي أنه توجد علاقة معنوية سالبة بين (السكريات الجلوكوز، الفركتوز، الدهون، الرماد)، ونسبة الإصابة لثمار التمور. وكانت هناك علاقة معنوية موجبة بين نسبة الإصابة ومحتوى البروتينات لثمار التمور.