

ON THE OCCURRENCE AND HOST PREFERENCE OF THE DATE PALM DUST MITE *OLIGONYCHUS AFRASIATICUS* (MCG.) ON DIFFERENT DATE PALM VARIETIES IN WADI HADRAMOUT – YEMEN

Saeed Ba-Angood* and Gamal Bassahaih

Department of Plant Protection, Nasir's College of Agriculture, University of
Aden, Khormaksar P. O. Box 6172, Aden, Yemen

ABSTRACT

Studies on the occurrence and host preference of the date palm dust mite (DPDM) *Oligonychus afrasiaticus* (McGregor) on different varieties of date palm in Wadi Hadramout have shown that the pest in the absence of fruits and in wintertime, stayed at the bases of the fronds and heart of trees. In Wadi Hadramout the pest started to appear on date fruits on the second week of March on Mijraf variety and continued to be present for almost 18 weeks till the third week of July. The pest attacked almost all date palm varieties, However, Hamra and Hajri varieties were found to be less susceptible, while Mijraf and Madini were comparatively more susceptible.

INTRODUCTION

Date palm trees in Wadi Hadramout (Republic of Yemen) are usually attacked by several pests, the most important ones are the lesser date moth *Batrachydra amydracula*, date palm stem borers (*Oryctes* spp) and the date palm dust mite (DPDM) *Oligonychus afrasiaticus* (McGregor) (Acarina: Tetranychidae). The later pest is known to occur in most date palm growing areas in the world and was reported from Iraq, Algeria, Kuwait, UAE, KSA, Morocco, Bahrain, Sudan, Egypt, Sultanate of Oman, Yemen, Mauritania, Iran, Chad, Mali, Niger and USA (Abdul Hussain 1985, Bass'haih 1999). Due to the heavy use of pesticides in Wadi Hadramout, the DPDM was widely spread during the last few years damaging almost 80% of the yield in some areas (Bass'haih 1999, Ba-Angood and Bass'haih 2000). The pest is known to attack only date palm fruits in the area. Larvae, nymphs and adults suck the sap of the unripe fruits, which render them dry, smaller in size and covered of mite threads. The infested fruits are totally unmarketable in areas of heavy infestation.

A recent study on the effect of the D P D M, *O. afrasiaticus* on the physiochemical characters of three different date varieties in Wadi Hadramout, was carried out in September 1998 at Seiyun Agricultural Research Station, it was shown that the dust mite had an adverse effect on

some of physiochemical characters of dates in Wadi Hadhramout. Infested dates of Mijraf, Madini and Hamra varieties were smaller in size, malformed and unripe, compared with healthy ones. They also had lower content of total soluble solids particularly sugars, and lower percentage of water content compared with the healthy ones (Ba-Angood and Bass'haih, 2000). Therefore the management of this pest is important; but before developing any IPM program for the pest, information on the population dynamics of the pest and the extent of loss in different varieties should be provided.

This study aims at finding out where the pest stays in absence of fruits and in wintertime, the period of infestation and whether it has any host preference among date palm varieties available in Wadi Hadramout.

MATERIALS AND METHODS

Occurrence of dust mite in absence of fruits

For finding out where the pest stays in absence of fruits, samples of leaf bases and contents of tree apex and heart were taken monthly from date palm trees, starting from August 1997 till July 1998. Samples were taken from 5 varieties of date palms namely; Madini, Mijraf, Hashdi, Hhmra and Jahmi. The weight of the sample content varied from 44-85g. The sample contents were taken to the laboratory at Seiyun Agricultural Research Station and checked using a Berlese Funnel as described by Bass' haih (1999). The mites escaped from the light above the Berlese Funnel, dropping down to tubes and then were put into Petridishes and counted under a microscope.

Development of infestation of the dust date palm mite *O. afrasiaticus*

For following up the occurrence of the mite on date palm trees 3 trees from each Madini and Mijraf varieties were selected. These varieties are the most common varieties in Wadi Hadramout. Three branches from bunches were taken randomly from each tree after fruit set to the laboratory. Fruits were then immersed in a beaker containing a solution of 1000ml of water + 100ml of sodium hypochlorite for 25-30 minutes, to dissolve mite threads, keep mites stretched and facilitate easy counting. The contents were then poured in a piece of white cloth, dried in filter paper and mites were then counted under a microscope. This trial started from the first week of March, where weekly samples were taken and continued till the fourth week of July 1998.

Host preference for the DPDM among different date palm varieties in Wadi Hadramout

To find out whether the DPDM has any host preference among date palm varieties in the area, percentage of infestation as well as severity or rate of infestation was determined.

Percentage of infestation was determined in 3 date palm growing areas in the Wadi namely; Seiyun, Tarim and Shibam. Twenty sites were selected and 8 varieties were included namely, Madini, Mijraf, Hajri, Hamra, Gizaz, Saree'a, Jahmi and Azar. One to two trees were taken at random from each variety in each site, according to the intensity of each variety in each site. The number of trees included in this trial reached 110 trees. Five branches from different bunches in each tree were taken to the laboratory. Fruits were counted and the percentage of infestation was recorded:

The severity of infestation was determined in 32 localities in 5 areas namely Seiyun, Tarim, Sah, Alqatin, and Shibam. Nine varieties were included namely; Mijraf, Madini, Hamra, Azar, Saree'e, Hajri, Jahmi, Hashdi and Gazaz. Twenty trees were inspected from each variety in each site. Bunches in date palm trees carrying fruits were checked using a binocular. Rate of infestation was determined visually as following:

0 infestation	No infestation	bunches healthy free from infestation
1-25	little infestation	¼ of bunches with fruits infested
26-50	Medium infestation	½ of bunches with fruits infested
51-75	High infestation	more than ½ and less than ¾ of bunches infested
76-100	Severe infestation	All bunches are infested

In these trials T- test was used to compare varieties as treatments and LSD was used to compare means statistically according to Snedecor and Cochran (1967) and Mead and Gurnow (1990).

Results and Discussion

Occurrence of DPDM in the absence of fruits

Data in Table 1 have shown that in wintertime, particularly in November, December and January and in absence of date fruits, individuals of mites (Larvae and nymphs) were found in the sample contents of leaf axils and bases as well as apexes of trees or the heart of the tree in numbers ranged from 6-7 per sample. Whereas in hot months particularly in May, June, July and August, where fruits started to

develop, the numbers ranged from 0-2 per sample. No mites were recorded in weeds around trees. This means that the mite spends the time of winter and in absence of fruits in the bases of fronds and the heart of the tree. This confirms what Abdul Hussain (1985) had observed in Iraq.

Table 1. Number of mites obtained from samples taken from heart and frond bases of date palm varieties in Wadi Hadramout

Month	Variety	Wt. of sample (ing)	Number of mites / sample	Total No	In Sample	Mean Tem. during the month (⁰ C)
August 1997	Madini	56	1	2	Seiyun	33.5
	Madini	60	1			
	Madini	55	0			
September 1997	Madini	55	1	2	Seiyun	31.0
	Madini	65	0			
	Madini	47	1			
October 1997	Madini	68	2	4	Seiyun	26.8
	Mijraf	82	2			
	Hamra	60	0			
November 1997	Madini	78	1	6	Qatn	25.1
	Madini	80	4			
	Hamra	82	1			
December 1997	Hamra	85	2	7	Seiyun	21.0
	Mijraf	76	3			
	Madini	64	2			
January 1998	Hamra	77	2	7	Seiyun	21.2
	Mijraf	73	2			
	Madini	52	3			
February 1998	Madini	73	2	4	Seiyun	24.6
	Madini	67	1			
	Hamra	83	1			
March 1998	Mijraf	52	1	3	Seiyun	26.3
	Mijraf	85	1			
	Hashdi	63	1			
April 1998	Mijraf	57	1	2	Seiyun	28.5
	Madini	46	1			
	Madini	75	0			
May 1998	Madini	48	1	1	Tarim	30.5
	Mijraf	44	0			
	Jahmi	52	0			
June 1998	Hamra	45	0	1	Seiyun	33.1
	Mijraf	75	0			
	Madini	64	1			
July 1998	Madini	51	0	0	Seiyun	33.5
	Mijraf	62	0			
	Mijraf	49	0			

Development of infestation of the dust date palm mite *O. afrasiaticus* in Madini and Mijraf varieties in Wadi Hadramout

Fig 1 shows that infestation of the DPDM (*O. afrasiaticus*) started on the second week of March and continued for almost 18 weeks till the third week of July. It reached its climax on the third week of May in Madini variety and on the first week of June In Mijraf variety. Our results are not in agreement with Bin Abdullah (1998) who reported that infestation of the DPDM started in Wadi Hadramout in May. It is also different from Al-Bakr (1972), Al-Haidari (1979) and Abdul Hussain (1985) who reported that infestation started in Iraq in July and it is severe in July and August. Saleh and Hosny (1979) showed that *Oligonychus* spp. infested date fruits in Egypt, beginning about 1 week after pollination and continuing until about 14 weeks after it.

Date palm varieties differ from one another in time of fruit setting and from one area to another due to the topographic and climatic conditions prevailing in the area. This may explain the difference in time and duration of infestation of *O. afrasiaticus*

Results in Fig 1 show that infestation in Mijraf variety started earlier than in Madini variety, this was due to the early flowering and fruit setting of Mijraf variety compared with Madini in the same area.

When we followed up the development of infestation of *O. afrasiaticus* we found that infestation increased from the second week of April in both varieties till the fourth week of April where it reached an average of 2581 and 1711 mites in each sample per tree in Mijraf and Madini varieties, respectively. It decreased again in the first week of May. This was due to some rains, which occurred, in the last week of April. Infestation again increased till it reached its maximum (2104 mite/sample/tree) in the third week of May in M dini variety, and in the first week of June (5345 mite/sample/tree) in Mijraf variety. In these months the number of mites obtained from leaf axils, bases and apex contents were ranging from 0-2, which means that mites migrated from these sites to the date fruits. During this period (third week of May till first week of June) the date fruits are in what they call the 'Jumri' and 'Khlal' stages. Such stages are mostly preferred for the DPDM. The ripe stage is not preferred for the DPDM. Temperature in these months ranged from 30.5 to 32.7°, which is considered the optimum for DPDM development (Al-Haidari et al 1982).

Table 2 shows that mean number of mites per branch of the bunch and per fruit, is different from one variety to another. This might be due to the relatively larger size of Mijrah fruit than Madini. In this connection Khanbari (1998) mentioned that the size of Mijraf fruit is 6.8cm³

compared to 5cm³ for Madini.. However the difference is not statistically different.

Table 2. Mean No. of *O. afrasiaticus* mites per individual date fruits for Mijraf and Madini varieties during the period May – July, 1998

Month	Week	Mean No of Fruits/ branch of a bunch		Mean No of Mites/ individual fruit	
		Mijraf	Madini	Mijraf	Madini
May	First	83.7	74.3	22	18.6
	Second	56.3	71	44.2	22.7
	Third	84	71.7	44.5	29.2
	Fourth	76.7	68.7	62.7	30.2
June	First	63	73	81.7	28
	Second	68.7	54	58	21.3
	Third	55.7	46.3	35.7	19
	Fourth	63.3	43.6	20.5	11.9
July	First	39	63.3	17	10
	Second	34	35.7	8.7	3.7
	Third	35.3	29.3	1.5	0.8
	Fourth	41.7	36.7	0.0	0.0

Host preference for the DPDM among different date palm varieties in Wadi Hadramout

In order to find out whether the DPDM prefers any variety of date palm in the area. Percentage of infestation of the pest as well as severity of infestation was determined. Sampled date palm trees were taken from the most dense growing areas in the Wadi. Table 3 shows that in Seiyun area, there is a statistical significant difference in percentage of infestation ($P = 0.05$) between, Hajri , Hamra and Gzaz varieties which have less percentage of infestation compared with Saree'a, Mijraf and Madini which have higher percentage of infestation. In Shibam area, Hamra, Hajri and Saree'a were less susceptible compared to Mijraf and Madini, and the difference between each group was statistically significant at $P = 0.05$. In Tarim area, Hamra and Saree'a varieties were less susceptible while Madini variety was the most susceptible. Mijraf was not grown in that area. Madini, Saree'a and Hamra were found to be the most common varieties grown in the three tested areas. When we compare percentage of infested fruits in these varieties in the three mentioned areas in the Wadi, we found that Hamra was less susceptible (36.7%) compared with Madini (69.2%). However, there was no significant difference among the three varieties in the three locations (Table 4).

When we take the severity of infestation into consideration, Table 5 shows that in Seiyun area, there is a significant statistical difference

($P=0.05$) in the rate of infestation between Hajri and Hamra in one hand which have means of infestation 15.0 and 15.3%, respectively; and Mijraf and Madini in another hand which have means of infestation 47.59 and 40.36%, respectively. In Shibam area, Hajri was less susceptible (14.3%) and Madini was high (45.8%). In Tarim area, Azar, Hamra and Jahmi were less susceptible compared to Madini. In Qatn area, Gzaz was less susceptible (4.2%) compared with Madini and Mijraf, which were comparatively highly susceptible, with a significant statistical difference at 5% (Table 5). In Sah area, the situation is different

where the rate of infestation was relatively low ((Table5). This might be due to the high humidity surrounding the area, as most of the trees are grown on the banks of

running streams. In this connection, Ba-Angood and Bass'haih (2000) have found that date palm trees grown on the banks of stream water in Sah are almost free from the DPDM, while when we go further to almost 1400m to the interior, infestation increased. Their results were in agreement of what Abdul Hussain (1985) has reported in Iraq.

Table 3. Mean percentage of infestation of *O. afrasiaticus* on different varieties of date palm in main growing areas in Wadi Hadramout

No	Variety	Main 10 infection in Main Date Palm Growing Areas		
		Seiyun	Shibam	Tarim
1	Mijraf	71.8	58.2	NA
2	Madini	86.9	57.4	63.3
3	Gzaz	42.8	NA	NA
4	Saree'a	66.5	45	29.9
5	Hamra	39.2	43.3	28
6	Hajri	30.3	43.8	NA
7	Jahmi	NA	NA	47.8
8	Azar	NA	NA	36.7
Mean		56.25	49.54	41.14
L.S.D. at (5%) for Varieties		23	6.49	18.14
For areas		18.7		

NA = Not Available

Table 4. Mean percentage of infestation of *O. afrasiaticus* on the most common varieties of date palm grown in main areas in Wadi Hadramout

No	Area	% infection in Varieties		
		Madini	Saree'a	Hamra
1	Seiyun	86.9	66.5	39.2
2	Shibam	57.4	45	43
3	Tarim	63.3	30	28
	Mean	69.2	47.1	36.7

L.S.D 0.05 insignificant

Table 5. Mean rate of infestation of *O. afrasiaticus* on the most common varieties of date palm grown in main areas in Wadi Hadramout

No	Variety	Areas				
		Seiyun	Shibam	Tarim	Qatn	Sah
1	Mijraf	47.59	35.90	NA	48.10	NA
2	Madini	40.36	45.8	26.3	52	NA
3	Gzaz	36.49	NA	NA	4.2	3.5
4	Saree'a	29.1	39	23.08	20,07	NA
5	Hamra	15.3	32	14	32	6.8
6	Hajri	15	14.3	NA	NA	NA
7	Jahmi	NA	NA	15.18	NA	NA
8	Azar	NA	NA	11.08	NA	NA
9	Hashdi	NA	NA	NA	NA	1.4
	Mean	30.64	33.4	17.93	31.29	3.9
	LSD (5%)					
	Vars	14.06	14.65	8.03	24.6	6.76
	Areas	15.5				

NA = Not available

In conclusion, we can say that in Wadi Hadramout, Hamra and Hajri date palm varieties were found to be less susceptible while Madini and Mijraf varieties were comparatively more susceptible. This might be due to early flowering and fruit setting of the most infested varieties as well as the size and surface area of fruits.

In Iraq, Abdul Hussain (1985) reported that Khadrawi, Dairy, Lailawi varieties were most susceptible while Sayer variety was less susceptible. In UAE, Nighal was reported to be less susceptible while Hilali was the most susceptible one (Min. of Agric & Fisheries (1983).

Our results on the population dynamics and variety preference of the DPDM are of utmost importance for any IPM program that could be developed for the management of this pest in Wadi Hadramout.

REFERENCES

- Abdul Hussain, A. 1985.** Date palms and Dates and their Pests. University of Bassrah, Iraq.
- Al-Bakr, A. 1972.** The Date Palm Tree. Its Past Present and the Newest for its Growth, Industry and Trade. Al-A'ani Press, Baghdad, Iraq.
- Al-Haidari, H. 1979.** Date palm insects and its control. A training course for date palm protection. Regional Canter for Date Palm and Dates Research in the Middle East and North Africa, Baghdad, Iraq.
- Al-Haidari, H., G. Al- Safi, N. Michael and N. Sallam 1982.** Effect of constant temperatures on the development of the dust date palm mite *Oligonychus afrasiaticus* Annual Book Plant Protection Research 2(1) : 165-167
- Ba - Angood, S. A. and G. S. Bass'haih. 2000.** A study on the Effect of Date Palm Dust Mite *Oligonychus afrasiaticus* (McGregor) (Acarin : Tetranychidae) on the Physiochemical Characters of Three Different Date Varieties in Wadi Hadhramout, Yemen. Arab J. Pl. Prot. 18(2): (in Press).
- Bass'haih, G. 1999.** Studies on the occurrence of the date palm dust mite *Oligonychus afrasiaticus* (McGregor) (Acarin : Tetranychidae) and its natural enemies on different date palm varieties in Wadi Hadramout. MSC Thesis – Department of Plant Protection, College of Agric, University of Aden. 55pp.
- Bin Abdalla, A. 1998.** A report on date palm cultivation in Yemen. FAO.
- Khanbari, O. S. 1998.** Quality and physiochemical characteristics of date varieties in Wadi Hadramout. First Date palm Symposium, Seiyun 27-30/6/1998. University of Hadramout.
- Mead, R. and N. R Gurnow 1990** Statistical Methods in Agricultural Experimental Biology .Great Britain.

Ministry of Agriculture and Fisheries (UAE) 1983. Date Palms in UAE. Department of Agriculture.

Saleh, M. R. and M. M Hosny 1979 .Observation *Oligonychus pp.* Occurring on date bunches . Research Bulletin, Faculty of Agric-Ain-Shams university No 1114, 8pp .

Snedecor, G.W. and W.G. Cochran 1967. Statistical Methods The Iowa State University Press Ames Iowa lisa. 448pp.