



First incidence of a spider mite, *Oligonychus tylus* (Baker & Pritchard), in date palm (*Phoenix dactylifera* L.) groves of Kachchh in Gujarat, India

C.M. Muralidharan*, D.A. Baidiyavadra, Kapil Mohan Sharma and N. Srinivasa¹

Date Palm Research Station, Sardarkrushinagar Dantiwada Agricultural University Mundra-Kachchh-370 421, Gujarat, India

¹University for Agricultural Sciences, GKVK Campus, Bengaluru-560 065, Karnataka, India.

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Date palm (*Phoenix dactylifera* L.) is one of the oldest cultivated crops of the desert region. It is believed to be originated in Mesopotamia (Southern Iraq) during 5000 BC (Zohary and Hopf, 2000) and it is commercially cultivated in more than 40 countries with 100 million hectares with a production of 7-8 million tones of dates (FAO Stat, 2017). In India, date palm is commercially cultivated in the western border, *i.e.*, the coastal belt of Kachchh district of Gujarat having about 2.0 million trees producing 17 thousand tons of fresh dates (Anonymous, 2018). This region enjoys the monopoly of the commercial cultivation of date palm and it is one of the subsistent crops of the agrarian community of western part of India.

One hundred and twelve species of insect and mite pests have been reported worldwide on date palm (El-Shafie, 2012). However, in the coastal belt of Kachchh, red palm weevil (*Rhynchophorus ferrugineus* Oliver; Coleoptera: Curculionidae), rhinoceros beetle (*Oryctes rhinoceros* L.; Coleoptera: Scarabaeidae) and date palm white scale (*Parlatoria blanchardi Targionii* Tozzetii; Hemiptera: Diaspididae) - cause economic damage (Muralidharan, 1993; Muralidharan *et al.*, 2000).

Mite infestation and damage to date palms were first recorded in Israel in the Southern Arava valley during the late 1970s (Gerson *et al.*, 1983) and

fifteen species of phytophagous mites have been reported from various date palm growing areas of the world (El-Shafie, 2012). However, no economic damage of mite incidence has reported so far from this crop from the Indian subcontinent.

A survey conducted by the Date Palm Research Station (DPRS), Sardarkrushinagar Dantiwada Agricultural University (SDAU), Mundra, during May-2016 has brought to the notice, certain mite species infesting fruit bunches from Dhrub village of Mundra taluk for the first time. The fruits were near to colour breaking stage (*khalal*), and severe mite infestation/damage was evident with spinning webs around fruit bunch with dusty appearance (Fig. 1). Extensive mite feeding on date fruit with webbing and mites' shed skins get covered by dust particles (Fig. 2). In addition to this, the highly turbulent wind carrying dust during summer months in the region was also responsible for this dusty appearance, which reduces the marketability of fruits.

The mite specimens were identified morphologically as *Oligonychus tylus* by the All India Network Project on Agricultural Acarology at the University of Agricultural Sciences, Bangalore using 10 male and five female microscopic slide-mounted mite specimens. Also, molecular data (for the mitochondrial gene) were

*Corresponding Author: muralidharanm@yahoo.com



Fig. 1. Spinning webs of *Oligonychus stylus* on date fruits



Fig. 2. Damaged fruit skin of dates by *O. tylus*

generated by DNA extraction (by CTAB method), PCR amplification with *COI* primers, Sanger sequencing and BLAST analysis followed by sequence deposition (accessioned) in NCBI-GenBank database. BLAST analysis showed a maximum of 98.53 per cent identity matching with other four sequences of *Oligonychus tylus* from India, available in the Gen Bank database. Slide mounted specimens are preserved as voucher specimens in the mite repository (UAS-B:1952 Dt. 02.05.2016 and UAS-B:1963 Dt. 23.05.2016) of University of Agricultural Sciences, Bangalore and available for retrieval or review.

To ascertain the incidence and severity of the damage, a roving survey was conducted during April-May, 2017 when fruits were of late *kimri* or early *khalal* stage. Twenty five villages distributed over four taluks were surveyed and monitored 118 orchards for mite infestation. The numbers of orchards were selected as per the cluster sampling method (Taherdoost, 2016) drawing approximately 25 per cent of the total orchards in each taluk and the villages were selected randomly. An orchard having 600-800 palms were considered for survey and sampling. The severity of mite infestation was computed by visual observation of webbing intensity on fruit bunches of infested palms and categorized as severe (S) if the webbing covered more than 50 per cent of the fruit bunch, medium (M) (10-50% fruit bunches) and mild (MI) <10% of fruit bunches per palm. Twenty five palms were

selected from each mite affected orchards, and five bunches per palm were selected randomly for assessing the damage.

The varietal response of mite infestation on five different varieties/clone at DPRS, Mundra was recorded and expressed as per cent webbing index (PWI) as per the procedure suggested by McKinney (1923) with slight modification on five randomly selected bunches per palm repeated on three palms per variety. The observation was taken at 15 days interval starting from 2nd week of April to 2nd week of May. The per cent webbing index (PWI) was derived on fruit bunches by applying a web rating scale of 0-10 (0 = no webbing; 10 =100 % webbing in fruit bunches) and an index was derived as per the following formula.

$$\text{PWI} = \frac{\text{Sum of all numerical score (Total score)}}{\text{Max. Score (Highest score observed in 0-10} \times \text{Number of bunches observed)}} \times 100$$

The survey conducted on 118 orchards spread over 25 villages of four taluks of Kachchh district of Gujarat, presented in Table 1, revealed that the incidence of *O. tylus* was spread over 63.55 per cent of the orchards and 43 orchards (36.45%) were free from mite incidence. Among different taluks, the highest incidence was observed in Anjar taluk (73.08 %), followed by Mundra, Bhuj and Mandvi taluks with an incidence of 64.32, 55.56 and 50.00 per cent respectively. Among the infested orchards (75), 18.64 per cent orchards shown severe mite

Table 1. Incidence and severity of spider mite damage on different villages of Kachchh (Apr-May, 2017)

Taluk	Villages	Number of orchards visited	Mite incidence*	Intensity		
				Severe	Medium	Mild
Anjar	Khedoi, Anjar, Veedi, Satapar, Ratnal (05)	26	19 (73.08)	06 (23.07)	04 (15.38)	09 (34.61)
Mandvi	Guthiyali, Bidada, Mankuva, NaniKhakar (04)	12	06 (50.00)	01 (8.33)	03 (25.00)	02 (16.67)
Mundra	Dhrub, Zarpara, Borana, Kapaya, Vadala, Bhujpar, Bharapar, Mangra, Sadau, Navinal (10)	62	40 (64.52)	11 (17.74)	10 (16.12)	19 (30.64)
Bhuj	Reldi, Kera, Kukma, Jhumkha, Baldiya, Mankuva (06)	18	10 (55.56)	04 (22.22)	01 (5.56)	05 (27.77)
Total (4)	25	118	75 (63.55)	22 (18.64)	18 (15.25)	35 (29.66)

Note: Severe (>50 % webbing bunch⁻¹ palm⁻¹); Medium= 10-50% and Mild <10%

*Values in parenthesis are in percentage value

infestation (>50% webbing per fruit bunches per palm), however, 15.25 per cent orchards registered medium infestation level (10-50% webbing), and 29.66 per cent orchards revealed mild infestation (<10% webbing). Among the taluks, Anjar recorded maximum orchards having severe mite incidence (23.07 %), followed by Bhuj (22.22 %) and Mundra (17.74 %). In Mandvi taluks, the severity of the mite incidence among the different orchards under survey was lowest (8.33 %).

The intensity of webbing observed on five different varieties/clones of date palm, starting from 2nd week of April to 2nd week of May presented in Table 2. The results indicated the highest webbing index of 41.93 per cent observed on cultivar KCCL 63, which was at par with cultivar KCCL 169 and cultivar ADP-1. Barhee showed lowest webbing index initially, which was at par with cultivar KCCL 091. However, no significant difference was observed among different varieties/clones.



Fig. 3. Intercropping of fodder sorghum with date palm

Table 2. Webbing index in different periods on different varieties/clones

Varieties/clones	% Webbing index		
	2 nd week of April*	4 th week of April*	2 nd week of May*
KCCL 63	40.20 (41.93)	50.12 (58.89)	47.78 (54.86)
KCCL 169	40.32 (41.9)	48.71 (56.46)	40.98 (43.03)
ADP-1	34.12(31.85)	50.64 (59.72)	41.18 (43.75)
Barhee	21.134 (13.33)	48.21 (55.56)	51.77 (61.67)
KCCL 091	28.96 (24.44)	50.15 (58.89)	43.91 (48.33)
S.Em ±	3.91	2.97	4.46
C.D. @ 5%	12.48	NS	NS
C.V. %	20.55	10.37	17.13

Note: *Data are arc-sine transformed; Values in the parentheses are original values. S.Em = Standard error of Mean, C.D. @ 5 % = Critical difference at 5% level of significance, C.V. = Coefficient of variation

Oligonychus senegalensis Gutierrez and Etienne and *O. afrasiaticus* McGregor are the two other dominant spider mite species occurring on date palm (Palevsky *et al.*, 2003) causing economic damage. However, in date groves of Kachchh we could observe only *O. tylos*, which is considered as a dubious species (Gupta and Gupta, 1994) and already reported from India on *Musa sapientum* L. of family Musaceae, *Panicum maximum* and *Zea mays* L. of family Poaceae, *Cocos nucifera* L. and *Areca catechu* L. of family Arecaceae (Zeity, 2015). This species is also reported from Mauritius on *Panicum maximum* Jacq. (Baker and Pritchard, 1960) and sorghum (*Sorghum bicolor* L.) both of family Poaceae by Sirsakar and Nagabhushan (1989).



Fig. 4. Predatory coccinellid *Stethorus* sp. in the web

Interestingly, in Kachchh cultivating fodder sorghum as an intercrop of date palm is a common practice to feed their domestic animals (Fig. 3). Even though *O. tylos* has been reported on date palm in Israel (Gerson *et al.*, 1983), but in their subsequent publication, it was reported that the species was misidentified as it was originally *O. senegalensis* (Palevsky *et al.*, 2003). Hence, the incidence and widespread fruit damage by *O. tylos* on date palms is the first report from India and the world.

No predatory Phytoseiids was observed in the mite colony. However, mite coccinellid predator *Stethorus* sp. (Coleoptera: Coccinellidae) was observed in the webs (Fig. 4). More detailed studies have to be initiated to understand the bio-ecology of mite faunal complex existed in the date groves of Kachchh.

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