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 Tozzetti; 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), Munda, 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
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.

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

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 \textit{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

\[\text{Fig. 1. Spinning webs of } \textit{Oligonychus tylus} \text{ on date fruits}\]

\[\text{Fig. 2. Damaged fruit skin of dates by } \textit{O. tylus}\]
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.

### 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* | 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, Bidad, 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) |

Note: Severe (>50 % webbing bunch⁻¹ palm⁻¹); Medium= 10-50% and Mild <10%
*Values in parenthesis are in percentage value

**Fig. 3. Intercropping of fodder sorghum with date palm**
**Table 2. Webbing index in different periods on different varieties/clones**

| Varieties/clones | 2nd week of April\(^*\) | 4th week of April\(^*\) | 2nd 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.

Similarly, *Oligonychus senegalensis* Gutierrez and Etinne 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. tylus*, 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 Sirsikar and Nagabhushan (1989).

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. tylus* 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. tylus* 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.

### Acknowledgement

The authors acknowledge ICAR for necessary support through All India Coordinated Trial on Arid Zone Fruits for conducting this survey.

### References

Anonymous, 2018. Area and production in different talukas of Kachchh. Deputy Director of Horticulture, Bhuj, Government of Gujarat.

Baker, E.W. and Pritchard, A.E. 1960. The tetranychoid mites of Africa. *Hilgardia* 29(11): 455-448.

El- Shafie, H.A.F. 2012. Review: list of arthropod pests and their natural enemies identified worldwide on date palm, *Phoenix dactylifera* L. *Agriculture and Biology Journal of North America* 3(12):516-524.
First incidence of spider mite in date palm

FAO, 2017. Food and Agriculture organization of the United Nations, 2017. Worldwide dates production stations. http://faostat/servlet.

Gerson, U., Venezian, A. and Blumberg, D. 1983. Phytophagous mites on date palms in Israel. Fruits 38:133-135.

Gupta, S.K. and Gupta, Y.N. 1994. A taxonomic review of Indian Tetranychidae (Acari: Prostigmata) with descriptions of new species, redescriptions of known species and key to genera and species. Memoirs of the Zoological Survey of India 18(1): 1-196.

Taherdoost, H., 2016. Sampling methods in research methodology: How to choose a sampling technique for research. International Journal of Academic Research in Management 5: 18-27.

McKinney, H.H. 1923. Influence of soil temperature and moisture on infection of wheat seedlings by Helminthosporium sativum. Journal of Agricultural Research 26: 195-217.

Muralidharan, C.M. 1993. Scale insects of date palm (Phoenix dactylifera) and their natural enemies in the date groves of Kachchh (Gujarat). Plant Protection Bulletin 45(2&3): 31-33.

Muralidharan, C.M., Sodagar, N.N. and Vaghasia, U.R. 2000. Survey, distribution, extent of damage, field behavior and biology of red palm weevil, Rhynchophorus ferrugineus Oliv. on date groves of Kachchh (Gujarat). GAU Research Journal 25(2):9-14.

Palevsky, E., Ucko, O., Peles, S., Yablonski, S. and Gerson, U. 2003. Species of Oligonychus infesting date palm cultivars in the southern Arava Valley of Israel. Phytoparasitica 31:144-153

Sirsikar, A.N. and Nagabhushanam, R. 1989. Biology of Oligonychus tylus: a potential mite pest of sorghum and other cereals. Journal of Acarology 11: 95-99.

Zeity, M. 2015. Tetranychid mite fauna of major agro-ecosystems in Karnataka and some aspects of molecular characterization of selected genera of spider mites. Ph.D. Thesis submitted to University of Agricultural Sciences, Bangalore, India, 240p.

Zohary, D. and Hopf, M. 2000. Domestication of Palms in the Old World. The Origin and Spread of Cultivated Plants in West Asia, Europe and Nile Valley. Oxford University Press, Oxon, UK.