



First Record of Cassava Red Mite, *Oligonychus biharensis* Hirst on Grapevine in India

Sheela Venugopal*, P. Sivasubramanian, S.V. Krishnamoorthy,
K. Ramaraju and S. Suresh

Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore – 641 003

During March-June 2012, cassava red mites, *Oligonychus biharensis* Hirst (Acari: Tetranychidae) were found infesting grapevine at Orchard, Tamil Nadu Agricultural University, Coimbatore. This was the first record of this mite, *Oligonychus biharensis* infesting grapevine in India. The mite colonized mainly on the upper surface of the mature leaves and built large colonies. The infested leaves looked dusty due to the thin webs constructed by the mites. Initial feeding caused white spots which later coalesced to form large chlorotic patches. Later stages of symptoms included dark brown patches, crinkling, drying and subsequent defoliation of leaves. Biology of the mite in the laboratory, revealed the mean developmental time for an egg to become an adult was 11.8 days and the mean fecundity was 27.2 eggs per female during of June, 2012. This indicated the potential of this mite pest to breed several generations in a year and implied the probability of this pest to attain a major status in future, when conditions are favourable.

Key words: *O. biharensis*, first record, alternate host, grapevine, *Vitis vinifera*

Grapevine is infested by several species of phytophagous mites right from buds to berries throughout the year. Grape bud mite and blister mite (*Colomerus vitis* Pachenstecher), grape rust mite (*Calepitrimerus vitis* Nalepa), bunch mite (*Brevipalpus californicus* (Banks) and *Brevipalpus lewisi* Mc Gregor), two-spotted spider mite (*Tetranychus urticae* Koch), European Red Mite (*Panonychus ulmi*) (Koch), Pacific spider mite (*Tetranychus pacificus* Mc Gregor), Willamette spider mite (*Eotetranychus willamettei* Mc Gregor) and Avocado brown mite, (*Oligonychus punicae* (Hirst)) (Flaherty *et al.*, 1999; Duso *et al.*, 2012) are few of the species, which are economically reported across the grape growing countries. In Maharashtra and Andhra Pradesh, six species of tetranychids viz., *T. urticae*, *T. cinnabarinus* (Boisduval), *T. neocaledonicus* Andre, *O. mangiferus* (Rahman and Sapra), *O. punicae* and *Eutetranychus orientalis* (Klein) were found causing damage to grapevine by Kulkarni *et al.* (2008). Among them, the two spotted red spider mite *T. urticae* was reported to cause severe loss in those states. An investigation was made on the diversity and biology of phytophagous mite pests of grapevine in Coimbatore at Orchard, Tamil Nadu Agricultural University, Coimbatore during 2011-2013.

Materials and Methods

Surveys were conducted in grapevines (varieties – Red globe, Crimson seedless and Italia) at Orchard, TNAU at monthly intervals from October, 2011 to March, 2013. Five leaves each from 20 randomly selected vines were observed using a 10x hand lens for the presence of mites. Leaves with mites were

collected in a paper bag and brought to the laboratory and kept in refrigerator until processing. Samples were observed with the help of stereo binocular microscope (Motic) and then the mites were mounted on glass slides in Hoyers' medium for identification. The slides were then viewed under phase contrast microscope (Leica DM 750 make) and the specimens were identified using the descriptions of Ehara (1966).

The biology of *O. biharensis* infesting grapevines was studied based on the methodology adopted by Chandrasekhar *et al.* (2008). Grapevine leaf discs (3.5 cm diameter) were placed on wet cotton bed in plastic cups with upper surface facing upwards. Adult female mites were collected from laboratory culture maintained in live grapevines at Insectary, TNAU, Coimbatore. One adult female was allowed on leaf disc for 6 hours for laying eggs. Mites were removed after at least one egg was found. Discs were checked every 24 hours to record the duration of different developmental stages viz., egg, larval, protochrysalis, protonymphal, deutochrysalis, deutonymphal, tritochrysalis, pre-oviposition, oviposition and post oviposition periods and adult male and female longevity. Leaf discs were changed every 3 to 4 days. Immatures were transferred to new discs carefully with the help of hair brush. Twenty replications were made for each generation. The experiment was conducted at room temperature and relative humidity ($28.1 \pm 4.3\%$ and $63.5 \pm 14.5\%$ respectively) at Insectary, TNAU, during June, 2012.

Results and Discussion

During the present study, several phytophagous mites were observed of which the cassava red mite, *Oligonychus biharensis* Hirst was found to be a new

*Corresponding author email: sheelavenugopal1@gmail.com

record in grapevine. These mites were observed to rapidly increase in numbers when the vines were spared of pesticide usage. Initial symptoms of damage were manifested in the form of numerous white spots at the points of feeding on the leaf surface. Continuous feeding caused fusion of these spots and formation of large chlorotic patches. Severe infestation and prolonged feeding resulted in the formation of dark brown patches, crinkling and subsequent drying and defoliation of affected leaves (Fig.1F).

These mites colonised mainly the upper surface of the mature leaves and built large colonies and occasionally found moving to lower surface at high population levels. Young or newly sprouted leaves of the host plant were left uninfested by the mite. Another character observed was its prevalence in shaded

leaves of the vine rather than leaves directly exposed to sunlight. The mites were found constructing thin webs on leaf surface (Fig. 1C) and infested leaf appeared dusty.

Adult female was approximately 430 μ long and 300 μ wide with an elliptical body, smaller, slender body and distinctly pointed abdomen (Fig. 1A & B). Both sexes were ferruginous to reddish brown, females being slightly darker. Females laid pearly like white eggs singly and randomly on the upper surface of the leaf beneath the thin webs which turned red subsequently before hatching (Fig. 1 D & E). There were four active stages viz., larva, protonymph, deutonymph and adult and three quiescent stages between larvae and adult namely protochrysalis, deutochrysalis and tritochrysalis during which the mites did not move or feed. The complete life cycle

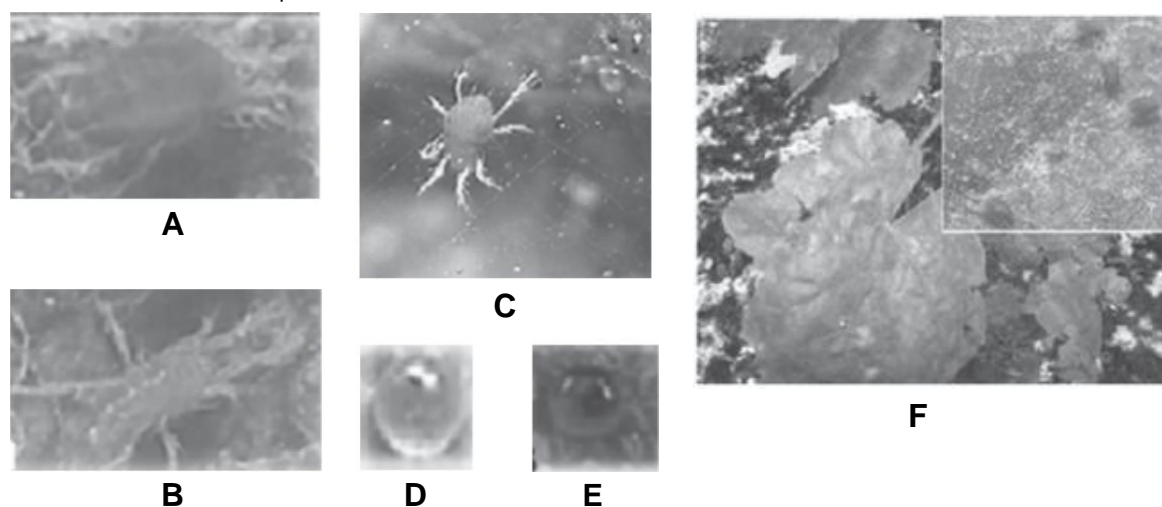


Fig. 1 A. *O. biharensis* Female B. Male C. An adult over thin web D. Freshly laid egg E. Matured egg F. *O. biharensis* infested grapevine leaf (Inset: Closer view)

from egg to adult was 11.8 days. The period for the emergence of larva from egg was 4.3 days. Larva took 1.6 days to enter into the first quiescent stage, protochrysalis (0.7 days). The subsequent stage, protonymph took 1.4 days to become deutochrysalis. After 0.9 days, the deutochrysalis became the next and last nymphal stage, deutonymphs which entered the final quiescent stage, tritochrysalis, in 1.7 days. In 1.2 days, the tritochrysalis emerged into an adult. The female mite took 1.1 days as pre-oviposition period and laid eggs for 10.8 days and thereafter lived for another 0.8 days, thus lived a total of 13.7 days as adult, while the longevity of the adult male mite was 9.8 days. The average number of eggs laid by a female mite was 27.2 (Table 1).

Oligonychus punicae (Hirst) was the first species to be recorded on grapevines as early as 1926 by Hirst from Tamil Nadu (Hirst, 1926). Singh and Saini (1971) reported *Oligonychus mangiferus* (Rahman and Sapra), *O. punicae* and *Tetranychus telarius* L. as pests of grapevines in India. *Brevipalpus phoenicis* (Geiiskes), *Eotetranychus truncatus* (Estebanes & Baker) and *Eriophyes (Colomerus) vitis* (Pags.) were

first reported by Gupta and Dhooria (1972) in Punjab vineyards. Eriophyiid gall mite, *Colomerus vitis* was observed by Rather (1999) to be very common and destructive species forming galls on the foliage and stunting the growth of grape berries in Kashmir Valley. Among the sixteen species of phytophagous mites reported by Rather (2008) in grape vineyards of Jammu and Kashmir, eleven species belonged to Tetranychidae, three species to Tenuipalpidae and two species to Eriophyiidae. Of them, spider mites viz., *O. mangiferus*, *T. urticae* and *T. cinnabarinus* were reported by as notorious pests of Indian vineyards.

During March, 2012, the incidence of *O. biharensis* was noticed for the first time in grapevines in India. This mite pest was first reported by Hirst (1924) in *Rosa* sp. but now it is reported in more than 70 hosts including cassava, arecanut, litchi etc., in India (Gupta, 1985). This indicated the wider host range of the pest.

This mite like other spider mites had very short life cycle (< 12 days) and high reproductive potential (> 25 eggs/ female) and thus can complete several generations in a single year. Similar findings

Table 1. Biology of grapevine spider mite *Oligonychus biharensis* (June, 2012)

S. No.	Developmental stage	Duration (days) Range*	Mean duration (days) ± SD
1	Egg	3-5	4.3 ± 0.6
2	Larva	1-2	1.6 ± 0.4
3	Protochrysalis	0-1	0.7 ± 0.3
4	Protonymph	1-2	1.4 ± 0.4
5	Deutochrysalis	0-1	0.9 ± 0.2
6	Deutonymph	1-3	1.7 ± 0.7
7	Tritochrysalis	0-2	1.2 ± 0.5
8	Total development period	9-14	11.8 ± 0.8
9	Pre-oviposition period	1-2	1.1 ± 0.3
10	Oviposition period	10-12	10.8 ± 0.7
11	Post-oviposition period	0-1	0.8 ± 0.2
12	Adult female longevity	12-15	13.7 ± 1.8
13	Adult male longevity	8-11	9.8 ± 1.4
14	Fecundity (eggs)	24-31	± 2.3

* Mean of 20 replication

were made by Sangeetha and Ramani (2011) in *O.biharensis* infesting cassava who reported the duration for completion of a life cycle to be 7.75 + 0.09 days and 7.0 + 0.06 days respectively for sexual and parthenogenetic development and the fecundity to be 44.6 ± 4.2 eggs and 30.6 ± 1.6 eggs for mated and unmated females respectively at 30 ± 2°C & 70 ± 5% RH. This study, thus revealed the potential and probability of this new mite pest, *O.biharensis* on grapevines to attain a major pest status in Indian vineyards in the future.

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