

The flat mite *Brevipalpus lewisi* (Acari: Tenuipalpidae) infesting the Dawn Redwood *Metasequoia glyptostroboides*

Authors: Hao, De-Jun, Fan, Bin-Qi, Su, Peng, Liu, Qun, and Wang, Yan

Source: Systematic and Applied Acarology, 18(2) : 197-199

Published By: Systematic and Applied Acarology Society

URL: <https://doi.org/10.11158/saa.18.2.12>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Correspondence

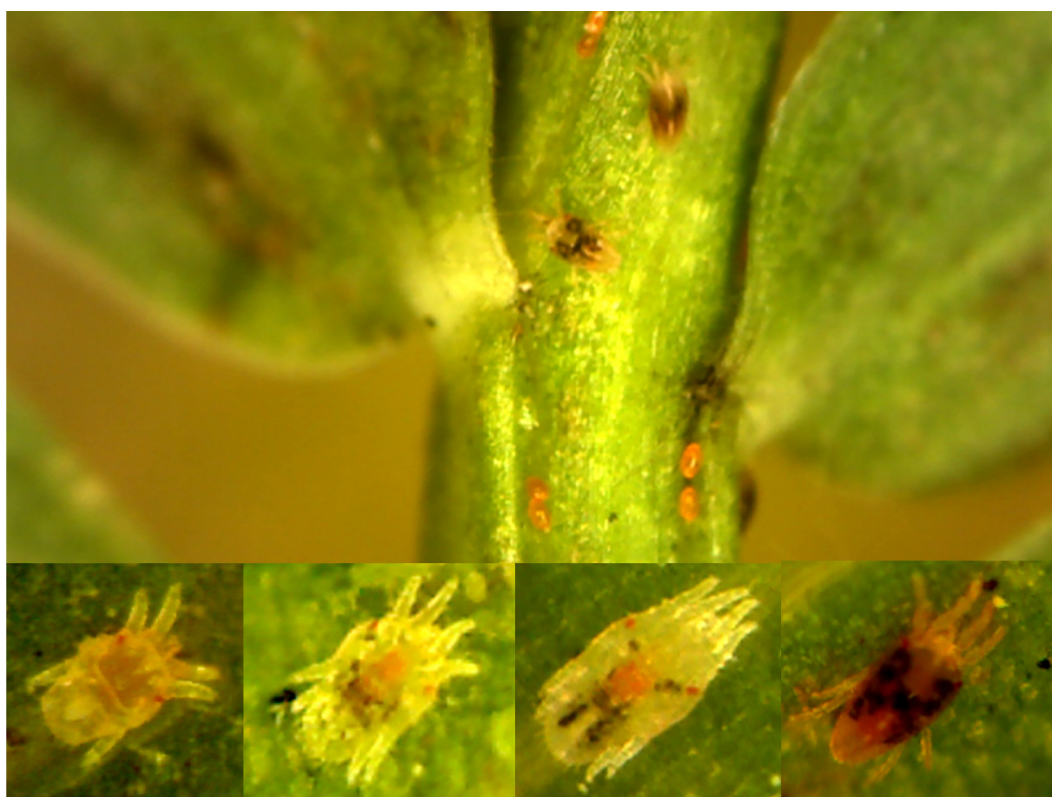
The flat mite *Brevipalpus lewisi* (Acari: Tenuipalpidae) infesting the Dawn Redwood *Metasequoia glyptostroboides*

DE-JUN HAO¹, BIN-QI FAN², PENG SU¹, QUN LIU¹ & YAN WANG²

¹ College of Forestry Resources and Environment, Nanjing Forestry University, Nanjing, Jiangsu 210037, P. R. China.

E-mail: djhao@njfu.edu.cn

² Forest Station of Shanghai, Shanghai 200072, P. R. China



Metasequoia glyptostroboides Hu *et* Cheng, a rare deciduous conifer of the redwood family (Cupressaceae), was discovered from fossil material (Miki 1941) and formally described in scientific literature as a new, existing species in 1948 (Hu & Cheng 1948). Though with a limited natural range in western Hubei, northern Hunan and eastern Sichuan provinces in central China (Chu & Cooper 1950; Bartholomew *et al.* 1983), the species is at present planted throughout the world in botanical gardens and arboreta from as far north as Scandinavia to as far south as New Zealand (Satoh 1999). The genus *Brevipalpus* have attracted extensive attention worldwide for their involvement in vectoring plant viruses (Chagas *et al.* 2003; Childers *et al.* 2003; Kondo *et al.* 2003; Rodrigues *et al.* 2003) since their first description by E.W. Baker (1949). Among the 16 species known in China (Zhang 2010), *Brevipalpus lewisi* McGregor (Acariformes: Tenuipalpidae) is reported to be widely

distributed in China, USA, Cuba, Japan, Egypt, Mexico, Spain, and Australia (Wang *et al.* 1981; Deng *et al.* 1989; Kerns *et al.* 2004; Lewis 1949; Rodriguez *et al.* 1987), with an extensive host range of citrus (Lewis 1949; Elmer & Jeppson 1957), pomegranate (Ebeling & Pence 1949), walnuts (Michelbacher 1956), grapes (Buchanan *et al.* 1980; Arias & Nieto 1985), and pistachios (Rice & Weinberger 1981).

Brevipalpus lewisi has been known as a pest of grapes in northern China such as Liaoning, Hebei, Shandong and Henan (Wang 1981; see also the review in Zhang 2010). However, in 2009, *B. lewisi* was found for the first time infesting *M. glyptostroboides* and inflicting considerable economic damage to the cities of Shanghai, Nanjing, and Wuhan in eastern China. The symptoms observed on the infested plants were leaf spots, color change from yellowish to brownish, as well as large numbers of mites and their exuviae on the lower surfaces of leaves (Fan *et al.* 2010).

Overwintering adult female *B. lewisi* feed on the new lower leaf surface of *M. glyptostroboides* and aggregate along the mid-vein in mid-May, depositing oval reddish eggs on the petiole in four to eight clusters. The population markedly decrease during the Meiyu season (East Asian rainy season) of June and early July, but increase and disperse over the plants in late July and early August. Afterwards, the population grow quickly and reach the highest density in late September. Finally, in late November, the adult female mites overwinter in the leaf sheath of current-year and one-year-old twigs. Preliminary observations suggest *B. lewisi* developmental rates are strongly influenced by the environmental conditions, especially temperature and rainfall. Dry and low-rainfall make the mites most virulent, leading to the outbreak period from August to October.

The cover image shows four active stages of *B. lewisi* growth: larva, protonymph, deutonymph, and adult. A physiologically active resting period exists between each active stage. The female adult is usually rufous amber in color with black pigmentation, while immature flat mites are slight red. *B. lewisi* reproduce by thelytokous parthenogenesis (Buchanan *et al.* 1980), with females producing females and no males were found. Reference specimens are deposited in the Entomology Specimen Room of Nanjing Forestry University, and some specimens were also in Institute of Zoology, Chinese Academy of Sciences, Beijing.

We thank two anonymous reviewers and Dr Zhi-Qiang Zhang for the improvement to this paper.

References

- Arias, G.A. & Nieto, C.J. (1985) The 'scab mite' *Brevipalpus lewisi* McGregor, a new pest of grapevine in Spain: overwintering, colonization of the vines, and survey in the region of Guarena (Ibadajoz). *Boletín del Servicio de Defensa contra Plagas e Inspección Fitopatológica*, 2, 193–203.
- Baker, E.W. (1949) The genus *Brevipalpus* (Acarina: Pseudoleptidae). *American Midland Naturalist*, 2, 350–402.
<http://dx.doi.org/10.2307/2422013>
- Bartholomew, B., Boufford, D.E. & Spongberg, S.A. (1983) *Metasequoia glyptostroboides*—its present status in China. *Journal of the Arnold Arboretum*, 64, 105–128.
- Buchanan, G.A., Bengston, M. & Exley, E.M. (1980) Population growth of *Brevipalpus lewisi* McGregor (Acarina: Tenuipalpidae) on grapevines. *Journal of Australia Agriculture Research*, 31, 957–965.
<http://dx.doi.org/10.1071/AR9800957>
- Chagas, C.M., Kitajima, E.W. & Rodrigues, J.C.V. (2003) Coffee ringspot virus vectored by *Brevipalpus phoenicis* (Acarina: Tenuipalpidae) in coffee. *Experimental and Applied Acarology*, 30, 203–213.
<http://dx.doi.org/10.1023/B:APPA.0000006549.87310.41>
- Childers, C.C., Rodrigues, J.C.V. & Welbourn, W.C. (2003) Host plants of *Brevipalpus californicus*, *B. obovatus* and *B. phoenicis* (Acarina: Tenuipalpidae) and their potential involvement in the spread of one or more viruses. *Experimental and Applied Acarology*, 30, 29–105.
<http://dx.doi.org/10.1023/B:APPA.0000006544.10072.01>

- Chu, K.L. & Cooper, W.S. (1950) An ecological reconnaissance in the native home of *Metasequoia glyptostroboides*. *Ecology*, 31, 260–278.
<http://dx.doi.org/10.2307/1932391>
- Deng, G.P., Wang, H.F. & Xi, J.L. (1989) *Profile of Acari in China*. Beijing, Science Press. 151 pp.
- Ebeling, W. & Pence, R.J. (1949) New pomegranate mite. *California Agriculture*, 6, 11–14.
- Elmer, H.S. & Jeppson, L.R. (1957) Biology and control of the citrus flat mite. *Journal of Economic Entomology*, 50, 566–570.
- Fan, B.Q., Hao, D.J., Ye, J.R., Wang, Y. & Ma, F.L. (2010) Toxicity test and control efficacy of four insecticides against *Brevipalpus lewisi* McGregor. *Forest Pest and Disease*, 6, 42–44.
- Hu, H.H. & Cheng, W.C. (1948) On the new family Metasequoiaceae and on *Metasequoia glyptostroboides*, a living species of the genus *Metasequoia* found in Szechuan and Hupen. *Bulletin of the Fan Memorial Institute of Biology, New Series*, 2, 153–161.
- Kerns, D., Wright, G. & Loghry, J. (2004) Citrus Flat Mite. University of Arizona, College of Agriculture and Life Sciences. Available from <http://cals.arizona.edu/crops/citrus/insects/citrusinsect.html> (last accessed 20 Apr. 2013)
- Kondo, H., Maeda, T. & Tamada, T. (2003) Orchid fleck virus: *Brevipalpus californicus* transmission, biological properties, and genome structure. *Experimental and Applied Acarology*, 30, 215–223.
<http://dx.doi.org/10.1023/B:APPA.0000006550.88615.10>
- Lewis, H.C. (1949) Injury to citrus by Tenuipalpus mites. *California Citrograph*, 29, 87.
- Michelbacher, A.E. (1956) Spider mites on walnuts. *California Agriculture*, 7, 4–14.
- Miki, S. (1941) On the change of flora in eastern Asia since Tertiary Period. I. The clay or lignite beds flora in Japan with special reference to the *Pinus trifolia* bed in central Hondo. *Journal of Japanese Botany*, 11, 237–303.
- Rice, R.E. & Weinberger, G.B. (1981) Citrus flatmite on pistachios in California. *California Agriculture*, 35, 25–26.
- Rodriguez, J.A., Arias, A., Santiago, R. & Nieto, J. (1987) Observaciones sobre la biología de *Brevipalpus Lewisi* (McGregor) en viñedos de la Comarca de Guareña (Badajoz), 1984–1986. *Boletín de Sanidad Vegetal Plagas*, 13, 249–259.
- Rodrigues, J.C.V., Kitajima, E.W., Childers, C.C. & Chagas, C.M. (2003) Citrus leprosis virus vectored by *Brevipalpus phoenicis* (Acarina: Tenuipalpidae) in citrus in Brazil. *Experimental and Applied Acarology*, 30, 161–179.
<http://dx.doi.org/10.1023/B:APPA.0000006547.76802.6e>
- Satoh, K. (1999) *Metasequoia* travels the globe. *Arnoldia*, 4, 72–75.
- Wang, H.F. (1981) *Economic Insect Fauna of China. Fasc. 23 Acariformes Tetranychidea*. Beijing, Science Press. 150pp.
- Wang, Y.Q., Cui, H.F. & Zhang, S.Y. (1981) Tetranychid mites and tenuipalpid mites infesting fruiting trees in North China. *Acta Phytophylacica Sinica*, 1, 9–16.
- Zhang, Z.-Q. (2010) Tenuipalpidae of China: a review of progress. *Zoosymposia*, 4, 151–157.

Accepted by Zhi-Qiang Zhang: 21 Apr. 2013; published 30 Jun. 2013