

Goji gall mite

Aceria kuko (Kishida)



Figure 1. *Aceria kuko* (Kishida), leaf galls on *Lycium* sp.

Background

In April 2008 the UK plant health authorities became aware of a substantial trade in 'Goji berry' plants, described as *Lycium barbarum* L. from China. This trade was recognised as being in contravention of the legislation (Council Directive 2000/29/EC ANNEX III/A 13.) that prohibits the importation of solanaceous plants intended for planting from third countries other than European and Mediterranean countries. The legislation was put in place primarily to safeguard important solanaceous crops such as tomato and potato from quarantine diseases. Between April and September 2008, a number of these imported *L. barbarum* plants were tested for a range of quarantine viruses and viroids, but none were found. However, in July and August plants exhibiting leaf galling were found by members of the public in Berkshire, North Yorkshire and West Sussex. In all cases the plants had come from China via the Netherlands to a nursery in Guernsey and were then supplied by mail order. It was found that the galls had been formed by the non-indigenous eriophyoid mite, *Aceria kuko* (Kishida), the Goji gall mite.

Geographical Distribution

Aceria kuko (Kishida) was described in 1927 in Japan, from specimens taken from the leaf galls found on *Lycium chinense* Miller (also known as Goji berry). Since then this mite has been recorded in South Korea, Taiwan, China and intercepted in the Netherlands. In 2008 it was detected for the first time in the UK, on plants (described as *L. barbarum* on the trade documentation) imported from China via the Netherlands and Guernsey.

Host Plants

In common with most eriophyoid mites, *A. kuko* has a limited host range. In addition to the type host *L. chinense*, this mite has been recorded to form foliar galls on two other solanaceous hosts: *Capsicum annuum* L. (pepper) and *Solanum nigrum* L. (Black nightshade). *Capsicum annuum* is a common cultivated glasshouse crop and *L. chinense*, *L. barbarum* and *S. nigrum* occur in the wild in Britain. In its reported range in Asia *A. kuko* has not been recorded from *L. barbarum*. As both *L. barbarum* and *L. chinense* bear Goji berries, there is doubt that the infected plants that have been distributed in the UK are actually *L. barbarum*, as stated by the exporter.

Taxonomy and Description

Adult mites are extremely small, measuring between ~170 - 250 µm in length (0.17-0.25 mm) by ~ 55 µm in width (0.055mm) (Fig. 2). As with most eriophyoid mites the body is wormlike or fusiform in shape and bears only two anterior pairs of legs. Adults are pale salmon pink in colour. Because of their size they are very difficult to see in the field and it is hosts' symptoms that first indicate the presence of this pest. Although host association is a fairly reliable way of identifying *A. kuko*, it is essential to examine slide-mounted specimens to check for key morphological characters, such as dorsal shield ornamentation (Fig. 3) and the structure of the empodium (foot) (Fig. 4), as there are other species of *Aceria* associated with *Lycium* spp. (Table 1.) and their host ranges may not be fully known.

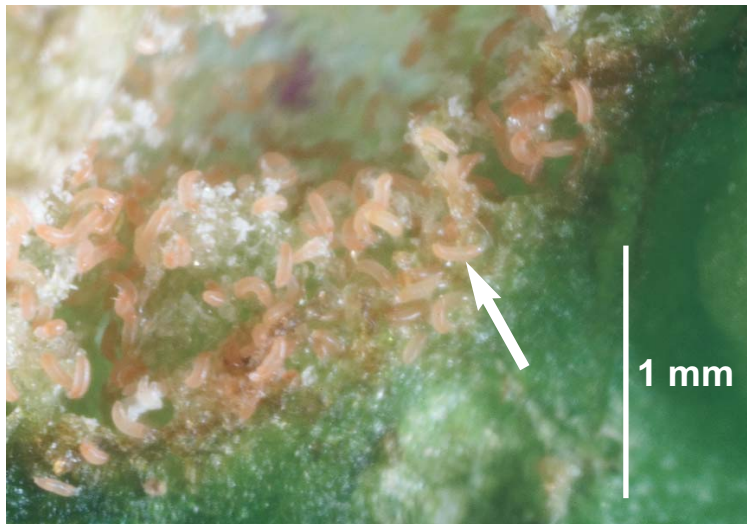


Figure 2. Various life stages of *Aceria kuko* (Kishida) feeding within a leaf gall. Adult mite arrowed

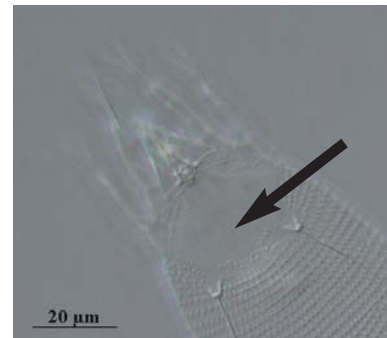


Figure 3. Dorsal shield (arrowed)

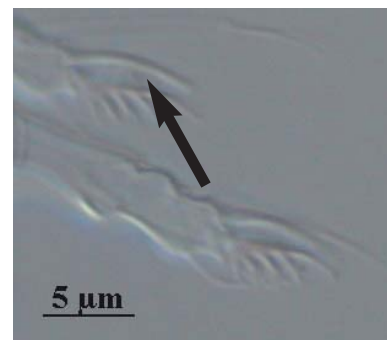


Figure 4. Empodium (arrowed)

Table 1. *Aceria* species associated with *Lycium* species Worldwide

Species	Geographical records	Type host	Alternative hosts.
<i>Aceria caulicecis</i> (Keifer)	USA	<i>Lycium andersonii</i> Gray	
<i>Aceria eucricotes</i> (Nalepa) = <i>lycii</i> (Canestrini)	S. Europe: Hungary, Italy. N. Japan USA	<i>Lycium europaeum</i> L.	<i>L. afrum</i> , <i>L. arabicum</i> , <i>L. barbarum</i> , <i>L. chinense</i>
<i>Aceria kendalli</i> Baker, = <i>eucricotesmultistriata</i> (Kendall)	USA	<i>Lycium barbarum</i> L.	None
<i>Aceria kuko</i> (Kishida) = <i>parawagnoni</i> (Kuang) = <i>tjyingi</i> (Manson) = <i>paramacrodonis</i> Kuang	Japan, China, South Korea,	<i>Lycium chinense</i> Mill.	<i>Capsicum annuum</i> ,
<i>Aceria macrodonis</i> Keifer	USA, Japan	<i>Lycium macrodon</i> Gray	<i>L. chinense</i>
<i>Aceria pallida</i> Keifer	USA	<i>Lycium pallidum</i> Miers.	None
<i>Aceria wagnoni</i> (Keifer)	USA	<i>Lycium cooperi</i> Gray	None

Biology

The biology of this *A. kuko* was studied in some detail in the late 1960s in Japan (Chinone, 1968) and Korea (Kim, 1968). Developmental parameters given at temperatures of between 25 –35°C are as follows:

- Fecundity: females produce about 28 eggs over a 6-day period
- Generation time (Egg to adult): 7.5 – 12 days
- Adult longevity: 25-30 days
- There are approximately 6-7 overlapping generations per year at these temperatures.
- *Capsicum annuum* (pepper) and *Solanum nigrum* (black night shade) are alternative hosts.

Eriophyoid mites generally transfer between hosts by passive dispersal on wind currents; wind direction influences the migration and dispersal of *A. kuko* (Kim, 1968). Phoresy on insects and birds may also provide a means of transfer between hosts. Over longer distances, such as those encountered in the international plant trade, mites will be dispersed with their host. According to Kim (1968) adult *A. kuko* over winters in the leaf galls. It seems that the populations of *A. kuko* found in the UK travelled in dormant (foliage free) plants. Eriophyoid mites on deciduous hosts such as *Lycium* tend to over winter under bud scale or in bark crevices, and can easily go unnoticed

Damage and detection

Established infestations have obvious symptoms in the form of bead-like galls 3-5mm in diameter (Figs. 1 & 5). These are yellowish green when viewed from the under surface of the leaves and correspond to reddish spots on the upper leaf surfaces (Fig. 6). The galls contain large numbers of pale salmon-pink mites (Fig. 2).



Figure 5. *Aceria kuko* (Kishida) galls on *Lycium* sp. viewed from the lower leaf surface



Figure 6. *Aceria kuko* (Kishida) galls on *Lycium* sp. viewed from the upper leaf surface



Figure 7. *Aceria kuko* (Kishida) leaf gall on *Capsicum annuum*



Figure 8. Foliar distortion caused by *Aceria kuko* (Kishida) on *Capsicum annuum*

Economic impact

No data are currently available regarding the economic impact of this mite. Severe leaf galling may reduce the ability of the plant to photosynthesise, thereby affecting fruit production. At The Food and Environment Research Agency, it was observed that (at 25°C, 65% humidity) *A. kuko* readily formed leaf galls on *C. annuum* plants (Fig. 7) and caused foliar distortion (Figs. 8 & 9); after two further weeks, the pepper plant aborted galled leaves.

Advisory information

A. kuko is a non-native plant pest and any suspected finds of Goji gall mite should be reported to the local Fera Plant Health and Seeds Inspector or
Tel: 01904 465625
Email: planthealth.info@fera.gsi.gov.uk
Web: www.defra.gov.uk/fera/plants/plantHealth

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Figure 9. *Capsicum annuum* plant damaged by *Aceria kuko* (Kishida)