The dreaded Red Spider Mite - *Tetranychus evansi* - in Sydney and what it means to Biosecurity and NSW Dept. Primary Industry

by

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This article is written to alert field biologists and bush regenerators, to the fact that the overseas Tomato Red Spider Mite has been introduced and caution needs to be taken to restrict spreading this potentially devastating pest whilst in areas known to be infested.

T. evansi originated from Brazil and spread to South and North America, Africa (end of 1980s) and Europe (Spain 1995). It had not been reported from countries in Oceania until October, 2013 when the NSW Department of Primary Industries (DPI) advised it has now entered Australia at Botany. The link below outlines the DPI 'Pest Alert' and describes this 'Tomato Red Spider Mite' which resembles two other species of spider mites.
http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/486179/Pest-Alert-tomato-red-spider-mite.pdf

On 9th January, 2014, Ray and Elma noticed in bushland near Venteman's Reach, Lane Cove West that weeds (mainly nightshade –*Solanum americanum*) had been pulled up and placed in a stack on the ground. Their attention was drawn to an orange mass amid webbing on the exposed roots. Fig.1 shows the colony of red mites, unable to feed on sap of the pulled-up weeds, positioning themselves for dispersal by the wind. Voracious predatory larva yet to be identified, were recorded among them. This is unusual because, unlike other red mites, *T. evansi* accumulates toxins from host plants. The potential for biological control is currently being explored by us.

Fig. 1: *T. evansi* red mites among webbing

Photos were taken and forwarded to Lane Cove Council who sent them to DPI. At the request of DPI, samples were sent by the authors and were confirmed by DPI expert entomologists at the Agricultural Institute, Orange, to be *Tetranychus evansi* Baker & Pritchard: *Tetranychidae.*

Further field studies by the authors revealed for the first time in Australia and overseas that the *T. evansi* red spider mite also parasitizes the common Kangaroo Apple shrub (*Solanum aviculare*). Fig. 2 records the characteristic webbing of *T. evansi* found on many Kangaroo Apple shrubs which inevitably die from the infestation. Several species of birds (vectors?) were recorded eating the red berries.

Fig. 2: *T. evansi* on *Solanum aviculare*

The mites are difficult to see individually without magnification and change colour during their lifecycle. Female mites are 0.5mm in size; orange-reddish and a broad oval shape. Males are 0.3 mm, light orange, more elongated and triangular in shape. Males are required for identification to a species level.

Females have a high reproductive rate:
~20 eggs/day (without mating) → high populations, under high temperatures and low humidity → causing important economic damage.

At 25°C, the lifecycle is completed in 13.5 days and the number of eggs laid can vary from approximately 80 eggs at low temperatures to 120–250 eggs at higher temperatures. The mites can remain undetected until major plant damage occurs and live on both sides of the leaves with a slight preference for the underside and for the vicinity of veins (Figs.3, 4).

Fig. 3: *T. evansi* on *Solanum americanum* (nightshade)

Eggs of *T. evansi* are rounded and deep to pale orange in colour. They are bright and clear when newly laid becoming rust red prior to hatching.

Our records demonstrate that the carved furrows in the plant tissue by the pest 28-dot ladybird beetle (Fig.5) and its larval instars (Fig.6) provide nesting for the mite's eggs (Fig.7). A *flea-beetle* species was found to behave similarly.

Fig. 4: *T. evansi* red mites on *Solanum aviculare*

Ongoing field studies have noted red-mite infestations in Boronia Park, (Hunters Hill); the Boreen and Batten Reserve (Lane Cove); Fairyland, Lane Cove National Park - added to other sightings in Sydney. To date, we have not been contacted by DPI for sites of located infestation. Minister of DPI claims *"It was technically not feasible to eradicate this pest"* which overseas is a highly destructive plant pest e.g., in Africa.
http://www.infonet-biovision.org/default/ct/74/pests

Figs. 5 & 6: 28-dot ladybird pest and its larva

The main hosts of *T.evansi* are plants in the *Solanaceae* family including weeds such as blackberry nightshade (*Solanum nigrum*), glossy night shade (*S. americanum*) and Kangaroo Apple (*S. aviculare*). Commodities affected by *T. evansi* include tomato, potato, eggplant, beans, citrus, cotton, tobacco and ornamentals such as roses. There is no currently registered *miticide* chemical for use against *T. evansi* in Australia.

Fig. 7: *T. evansi* eggs (red) laid in furrows left by plant-eating 28-dot ladybirds and their larva

Bush regenerators and field biologists should be aware of the signs of infestation and measures of containment. Affected weeds and shrubs should be carefully removed and incinerated. Professional advice should be sought for effective management and control of this potential threat to our agricultural industry. However, DPI – 'Biosecurity' claim they do not have the financial/human resources to eradicate this dreaded, newly arrived pest and shift responsibility to industry and local government for its management. Spraying infestations beside rivers is banned and also undesirable ecologically.

We decided out of interest to record the interdependency of species involved with this Red Mite and *Solanum aviculare* as this association was new to science although the Mite's association with *other* species of *Solanum* is very well documented overseas. The 'Red Mite' interest with a focus on the Kangaroo Apple shrub has given us the opportunity to record several new observations and new species. The following is one:

A new parasitoid female wasp in the subfamily *Tetrastichinae* of the family *Eulophidae* was recorded inserting its ovipositor in eggs of the 28-dot ladybird beetle. As the wasp moved from egg to egg, withdrawing its ovipositor, droplets of fluid from the egg appeared. (Figs 8, 9) This fluid subsequently provided substrate for a fungal mold which remained on the shell until the larvae of the wasp hatched. (Figs. 9, 10)

Fig. 8 parasitoid wasp withdrawing ovipositor from ladybird egg

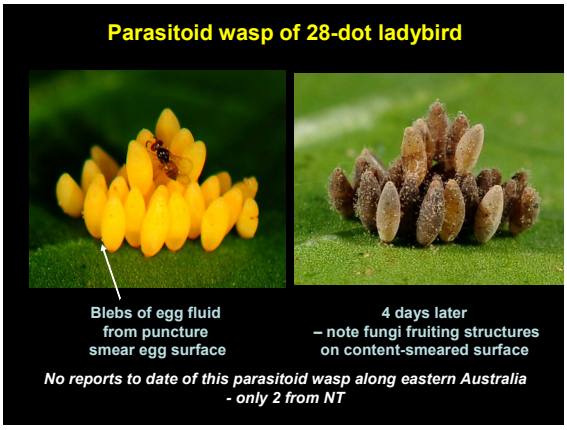

Fig. 9 Fungal mold on eggs 'stung' by wasp

Fig. 10 Wasp larva hatching from ladybird eggs

Other observations by us include a new species of *Uga* wasp parasitizing the late stage instar of the 28-dot ladybird. Research is now being undertaken in collaboration with Australian and overseas entomologists - similarly, for a new species of *Strepsipteran*.