

Eriophyoids

Not all mites are equal

PART 2
of a three-part series on mites

Eriophyoid mites are a unique group of crop pests, better known as bud mites, rust mites or gall mites. By Davina Saccaggi, Elleunorah Allsopp, Nompumelelo Ngubane-Ndhlovu and Edward Ueckermann (CRI, ARC Infruitec-Neitvoorbij, DALRRD, North-West University)



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Eriophyoid mites (erios for short) are the smallest of all mites, with adults around 0.5 mm long. Their small size makes it difficult to spot them in the field, even with a good hand lens. They are sporadic pests that cause serious damage during outbreaks. Usually, erios are found because of the symptoms they cause – bud deformation, rusting or galling, depending on the species. Some erio species live on plants without causing symptoms at all. If you do see them (usually with the help of a microscope), they are unmistakable: they look like miniature worms with tiny legs at the front end. All erios are plant-feeding and very much host-specific. Some are serious crop pests. Because they are so tiny, many species (especially those that don't cause symptoms)

are undiscovered. Currently there are over 4 865 species known world-wide, around 250 in SA, with more being discovered every day. In fact, the Agricultural Research Council (ARC) has officially listed 25 as pests in SA. Let's look at just a few of the more common ones.

Bud and gall mite erios

All their lives, these species live inside the plant bud or gall. They may occasionally move between buds or galls, usually during the night or early in spring, following the new growth. Erio species prefer feeding on new growth, so will often be found on the growth tips or new flush. In the case of bud mites, their feeding on the growing bud causes tissue death, resulting in growth deformation. Symptoms include reduced fruit set, deformed fruit or leaves, shortened internodes and bushy growth ("witches-broom" growth). Galls are usually the plant's reaction to the mites' feeding, and will occur wherever the erios have fed. In turn, these galls create an ideal, safe living space for further generations of the mite. Bud and gall mites are particularly hard to control, because they are safely enclosed in the bud or gall. So, chemical sprays don't easily reach them. Some predators also have a hard time fitting into the small enclosed spaces. Therefore, not all predatory mites are suitable for erio control either.

The citrus bud mite, *Aceria sheldoni* (Figure 1), occurs in all citrus-growing areas in SA. It feeds on buds, moving constantly outwards and upwards towards new growth, but will happily overwinter in dormant buds. The most serious damage is caused on lemon, where infestations will result in significantly deformed fruit.

The blueberry bud mite, *Acalitus vaccinii* (Figure 2), is a new arrival in our country, from North America. It was first noted in Mpumalanga in 2014. This bud mite prefers to feed on the fruit buds, resulting in gall formation and limited fruit set. On the farm where it was first discovered, the farmer reported an 80% decrease in fruit production

Figure 1 a – b: Citrus bud mite, *Aceria sheldoni*. Deformed fruit. Figure 2 a – c: The blueberry bud mite, *Acalitus vaccinii*. a: Damaged flower buds, showing red galls instead of blossoms, b: Close-up of an erio colony inside the bud, and c: Scanning electron micrograph (SEM) photo of the mite.



1a



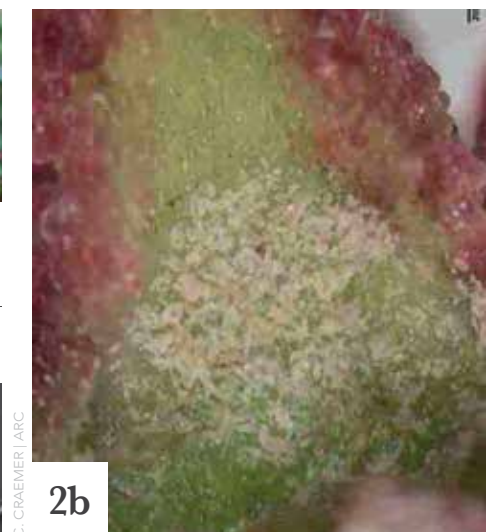
1b



2a



2c



2b

Take-home message

Bud, gall and rust mites are not visible with the naked eye. Some of the same symptoms can be caused by other organisms or factors and can be mistaken for erio damage. Therefore, the presence of erios must be confirmed with a microscopic examination performed by an expert. Only then should control measures be considered.

over the course of two years. Extensive chemical spraying did not reduce the mite population. Currently, blueberry bud mite is only present in the northern production areas, and is absent from the Western Cape – where most blueberries are produced. It is strongly advised not to transport blueberry plant material between provinces, to reduce the risk of spread to new areas.

The grapevine bud, blister and leaf curl mite, *Colomerus vitis* s.l. (Figure 3), is widespread on grapevines, and the sight of blisters (also called erineae) on grapevine leaves is common. When this erio was first discovered in leaf blisters, it was not considered to be an economic pest. Similarly, leaf curling is not a common symptom and not economically damaging. Therefore, for many

years this mite was ignored as unimportant. However, in the mid-1960s this erio was also found in buds. It was shown to cause bud damage, resulting in distorted and stunted growth, deformed leaves and poor berry set. Nowadays, vineyards are regularly inspected for symptoms and dormant buds are sent to the ARC for microscopic confirmation of bud mite presence.

Since the same mite is associated with three different symptoms, for many years it was assumed that there were three different erios strains, and that bud mite would not cause blisters and vice versa. However, new genetic research in SA has shown that “*C. vitis*” is actually a complex of cryptic species (meaning they’re very similar and we can’t tell them apart) occurring in all the symptoms (buds, blisters and leaf curl), with no clear association between any one species and symptom.

Rust mite erios

These erios live on more exposed places on the plants, such as the leaves or fruit. Typically, their feeding causes a rusting or silvery on the surface (although, some do not cause any symptoms). They’re easier to control than bud or gall mite species, since they are easily reached by chemical sprays. In autumn they will usually crawl to the buds where they overwinter, leaving again in early spring to feed on the new growth. In South African fruit, two species are notable.

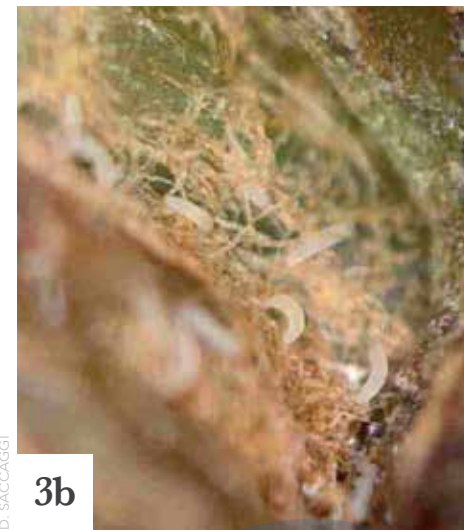
Citrus rust mite, *Phyllocoptura oleivora* (Figure 4), is one of the most wide-spread citrus pests in the world. It reproduces rapidly, often reaching damaging levels before it is noticed, and when it is too late to prevent fruit damage. The citrus rust mite is found on citrus throughout SA, but is only problematic in areas of high summer humidity. Damage can occur on very young fruit, only becoming visible as the fruit grows and the damaged portion enlarges. Severe rust mite infestation may also cause leaves and branches to brown, with possible leaf drop.



3a



3c



3b



4



5

Figure 3a: Blisters (erinea) on leaves, as symptoms of grapevine bud, blister or leaf curl mite, *Colomerus vitis* s.l. b. Close-up of mites in the buds, and c. A SEM photo of the mite Figure 4: Citrus rust mite, *Phyllocoptura oleivora*, rust symptoms on oranges Figure 5: Citrus grey mite, *Calacarus citrifolii*, concentric ring-blotch symptoms on a sweet orange cultivar.

The citrus grey mite, *Calacarus citrifolii* (Figure 5), is the only erio on this list that is indigenous to Southern Africa. It occurs in Zambia, Zimbabwe, Mozambique, Nigeria, Angola and SA. It was initially thought to occur on many host plants in over 15 different families, which is extremely unusual for an erio. However, current research is showing that there actually are a number of different erios species, each probably occurring only on a single host. The species that occurs on citrus is associated with concentric ring-blotch, in which leaves develop irregular necrotic lesions 1-3 weeks after mite feeding. It is not known if the ring-blotch is caused by a toxin in the erio’s saliva or by a virus or bacteria that it transmits. Citrus grey mite is a very sporadic pest, causing serious damage during outbreaks, especially in the northern parts of the country.

In addition, a number of other erios are pests of fruit crops in SA. These include fig bud mite (*Aceria ficus*), pomegranate leafroll mite (*Aceria granati*), mango bud mite (*Aceria mangiferae*), olive bud mite (*Aceria oleae*), peach silver mite (*Aculus fockeui*), pear rust mite (*Eritrimerus pyri*) and pear bud mite (*Eriophyes pyri*).

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