

Grapevine bud mite



Colomerus vitis

Common names: grape erineum mite

Higher taxon: Acari: Acariformes: Prostigmata: Eriophyidae

Synonyms: *Eriophyes vitis* (Pagenstecher), *Phytoptus vitis* Pagenstecher

EPPO code: ERPHVI

Grapevine bud mite is an important economic pest of grapevines in South Africa as well as in Europe, Russia and Australia. Grapevine bud mite is a microscopic worm-like pest which lives and feeds within dormant grapevine buds. It has an egg stage, two nymphal instars, and male and female adults, all of which may be found in clusters of hundreds of individuals within dormant buds.

There are three strains of grapevine bud mite which cause different types of damage: the bud strain can cause stunted growth or even bud death, the erineum or blistering strain causes leaf galls, and the leaf-curling strain can cause leaves to deform and curl.

The presence of grapevine bud mite must be monitored within dormant buds through expert services. A protocol exists for submitting grapevine bud samples for microscopic inspections. If these inspections find over 30% infestation, then chemical controls should be applied when shoots are 10 cm long, as adult mites exit dormant buds to migrate to new buds. Chemical controls should otherwise be avoided as they can lead to resistance development within the bud mite strains.



Grapevine bud mite feeding damage.

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BIOLOGY

Number of generations per year: ≤ 12

Length of generation from egg to adult: 10-14 days

Adult mites overwinter within grapevine buds. They spend the winter below the plant scales of the buds and are often found in bunches of hundreds of individuals. Reproduction is via arrhenotoky – females develop from fertilized eggs while males develop from unfertilized eggs. Spermatophores are deposited on leaves by males, and these are taken up by females for egg fertilization.

When the buds begin to swell in springtime, female grapevine bud mites lay eggs within the buds. A typical adult female may survive for one month and lay one egg per day. Eggs hatch 5-25 days after being laid. There are two nymphal stages before the adult emerges.

Juveniles feed under plant scales on plant cells within the grapevine buds. Juvenile development takes up to 20 days, depending on environmental conditions and nutritional value of the plants. Under good conditions development can be very rapid and lead to many generations within one year.

Generations which occur closer to autumn feed deep inside developing buds and may cause harm to developing grape bunches and leaves. Grapevine bud mites are transported from vine to vine most often by being carried by the wind. Farm machinery and human activities may also transfer bud mites from place to place.

There are three strains of the grapevine bud mite: bud strain, erineum or blister strain and leaf curling strain, each of which causes different damage. The mouthparts of the grapevine bud mites are so small that feeding (sucking) damage alone does not cause much damage. However, bud mites release a toxin in their saliva which causes damage symptoms to occur.

Damage symptoms of the bud strain of the grapevine bud mite include stunted leaves which appear small and misshapen with rounded serrations at the base of the leaves. Blunted grape bunches may also appear. These small bunches may also rot more easily. Flat shoots with short internodes and a zigzag growth pattern may appear (witches' broom growth). Primary buds may die leading to uneven bud burst and lower yield.

The erineum strain feeds on undersides of leaves and causes galls to protrude from the upper surface of the leaves. Beneath the leaf, the galls are filled with long hairs which turn brown and felt-like. In severe cases, leaves are misshapen and shrunken, which exposes grapes bunches to sun.

The leaf curling strain is less common but has been recorded from USA and South Africa. It causes leaf edges to curl down and inwards so that leaves appear bowed at the top.





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IDENTIFICATION

Egg

Size: 0.06 mm long

Duration: 5-25 days

Oval, translucent or white. Laid in batches of 2-10 eggs or more.

Larva

Final instar size: >0.15 mm head capsule width

Duration: ≤ 20 days

Appear similar to adults but smaller.

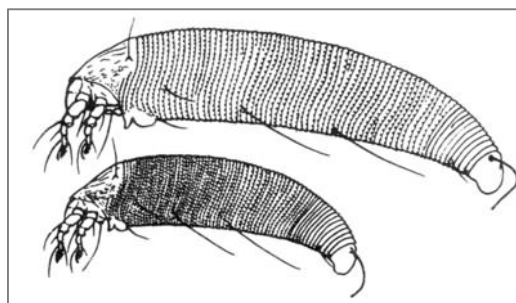
Adult

Size: female: 0.16-0.2 mm; male: 0.14-0.16 mm

Duration: 30 days

Number of eggs laid by single female: 30 eggs

Tiny worm-like mites which appear yellowish or white. Males are slightly smaller than females. When viewed under a stereomicroscope, there are some diagnostic features which can be seen. Two pairs of legs are present at the anterior end, near the head. There are also a series of rings around the abdomen.

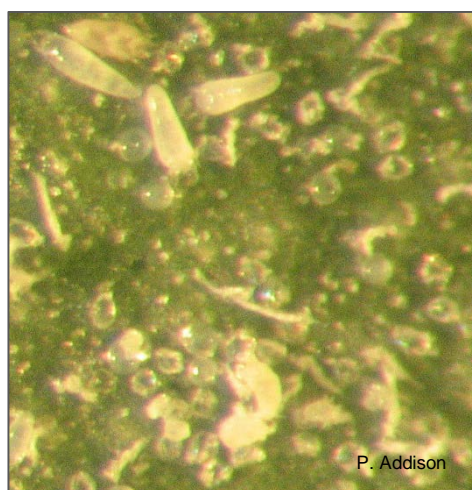


Grapevine bud mite adults females (top) and males (bottom). From:

http://www.agroatlas.ru/en/content/pests/Colomerus_vitis/



Grapevine bud mite, *Colomerus vitis*, dense population



Grapevine bud mite adults and eggs.



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ECONOMIC IMPORTANCE



Grapevine bud mite infestation can cause extensive damage if untreated because grape bunches and leaves lack normal development and experience reduced yield. Under extreme infestations, buds may die, and leaves and bunches may drop. Leaves may also curl, leading to stunted plant growth and reduced yield.

In South Africa, as well as in Europe, Russia and Australia, uncontrolled grapevine bud mite may lead to 56% economic losses. Very large populations of the erineum strain may occur before any damage is observed.

HOST PLANTS

Grapevine bud mite is restricted to cultivated and wild species of grapevines, but it has also been recorded rarely from persimmon.

Common name	Scientific name	Family
Persimmon	<i>Diospyros kaki</i>	Ebenaceae
Grapevine	<i>Vitis</i> spp.	Vitaceae

QUARANTINE REGULATIONS



Grapevine bud mite is a quarantine pest in Jordan only.



ARC Infruitec/Nietvoorbij

Grapevine erineum mite damage.



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MANAGEMENT

Monitoring

In order to determine whether a vineyard is infested with bud mite, the first indication is deformed leaves or bunches, short or zigzag internodes or “witches broom” growth which all occur shortly after bud burst.

To determine the presence of bud mites, dormant buds must be inspected microscopically. This can only be done in the winter, from about May to bud burst. In particular, bud samples should be taken after leaf fall but before or during pruning. This service is offered by the ARC Infruitec-Nietvoorbij, Stellenbosch University pest and disease clinic, as well as several private monitoring companies. A protocol exists where 16 shoots per hectare are collected from throughout susceptible vineyards, where damage has been noticed. The shoots should include at least 8 lower buds for inspection.

If expert inspection finds infestation of over 30%, regular control measures should be applied. No measures should be applied if infestation is below 30% or if an expert has not inspected the sample, since this can lead to resistance development. Sauvignon blanc, cabernet sauvignon, ruby cabernet, muscat varieties as well as Waltham Cross, Hanepoot, Palomino, Dauphine, Dan-Ben-Hannah and Sultanina are particularly susceptible and should be monitored carefully.

Prevention

Since bud mites occur predominantly in the first four buds, a particular pruning technique has been recommended to encourage bud burst in uninfested buds and to elevate yields. Mites can be reduced by careful, strain-specific pruning based on knowledge of pest distribution in the various buds. In the first year, pruning should leave behind the less infested buds. These will become the cane growth for the coming year. In the second year, pruning should remove all canes grown out of more infested buds.

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MANAGEMENT

Control measures

While there are several effective chemical controls, these must be timed carefully as they will not reach the bud mites while they are inside the buds. Instead, chemical controls target bud mite adults as they move from the dormant buds to the new buds on the leaf axil early in the season. Mites are only outside of buds for an approximate period of about 10 weeks after bud burst, depending on cultivar.

Sprays are applied when shoots are 10 cm long, with one or two more additional sprays at 14 day intervals after the initial spray. Severe infestations must be treated repeatedly over a few seasons to be effective. Furthermore, IPW guidelines require that sprays be applied only after microscopic surveys in order to prevent resistance development in the bud mites.

Natural enemies (biological control)

Several species of phytoseiid predatory mites can effectively control grapevine bud mite. Species from the genera *Euseius* and *Typhlodromus* in particular are important natural enemies of grapevine bud mite. Thrips and larvae of cecidomyiid flies may also be beneficial predators. Entomopathogenic fungi may be effective in humid regions.



Grapevine erineum mite feeding damage.

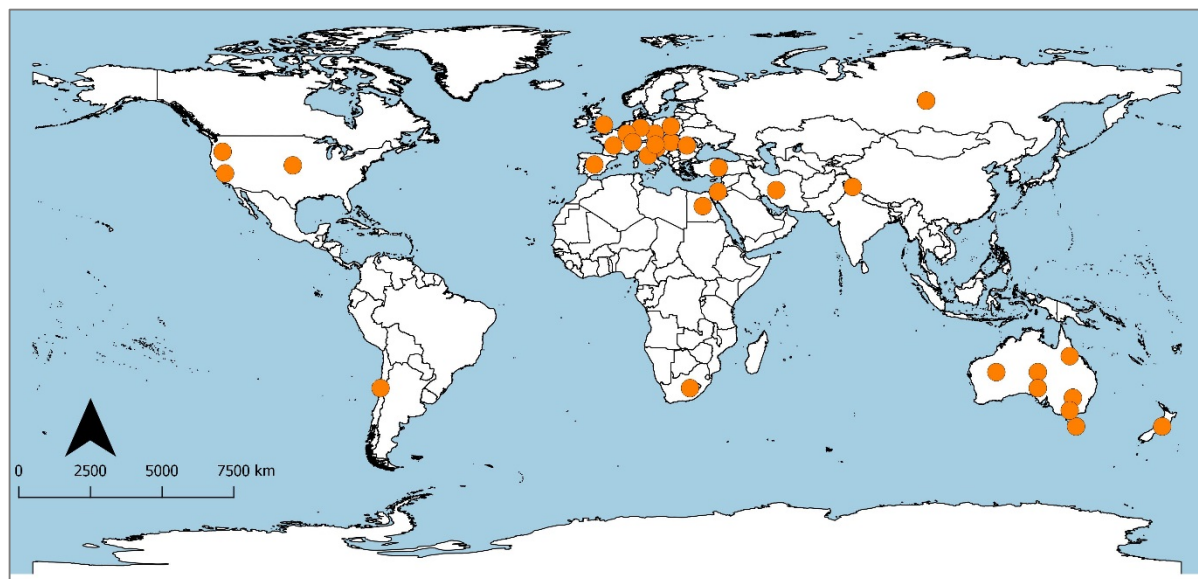
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DISTRIBUTION

Grapevine bud mite is cosmopolitan in distribution and present everywhere that grapevines are grown. In South Africa, grapevine bud mite is present in all grape-growing regions and on all cultivars.



Grapevine bud mite, *Colomerus vitis*, distribution. Data from CABI (2017). Map drawn by C.S. Bazelet.

REFERENCES

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