

# Grape Bud Mite Problem

seven symptoms of vineyard infestation which bud mite may produce on vines described for growers

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The grape bud mite is responsible for serious damage to grape vines, and causes loss of crop.

The damage is often obscure and a grower may be unaware that his crop has been damaged, until harvest time, when he discovers a low tonnage crop. The causes of poor crop are difficult to identify at harvest since most of them operate in the spring and early summer.

The symptoms or injury produced by the bud mite are many and variable. Some of these symptoms may be produced by other causes such as thrips, diseases, weather, soil and moisture. The symptoms attributed to bud mites may be described, as follows:

## Short Basal Internodes

The joint on the cane from which a leaf arises is called a node and the length of cane between two adjacent nodes is called the internode. In the dormant grape bud in the winter, some six or seven

nodes can be seen under a microscope when the bud is cut open. In some obscure manner the bud mites injure these internodes. In the spring these internodes fail to grow in length, although they increase normally in diameter. The first six or seven internodes may total only one or two inches in length, whereas normally they should approximate 14 inches. In the early spring, when the first internodes should be elongating, the bud mite damaged vines appear not to grow. Later, when the time arrives for the eighth, ninth, and subsequent internodes to elongate, they do so, and the vine develops a good crop of long canes and normal leaves.

## Scarification

The mites have lancelike mouthparts, somewhat like a mosquito. They insert these mouthparts into the epidermis—the thin outer layer of the cane bark—many times which kills the epidermis and causes a slight brown scarification on the green bark of the shoot. Thrips also cause a brown scarification which is coarser, more conspicuous, and extends beyond the seventh node.

## Flattened Canes

In about one fourth of the cases observed, bud mite injury causes a flattening of the cane in the basal portion. Such canes may be twice as wide as they are thick.

## Dead Terminal Buds

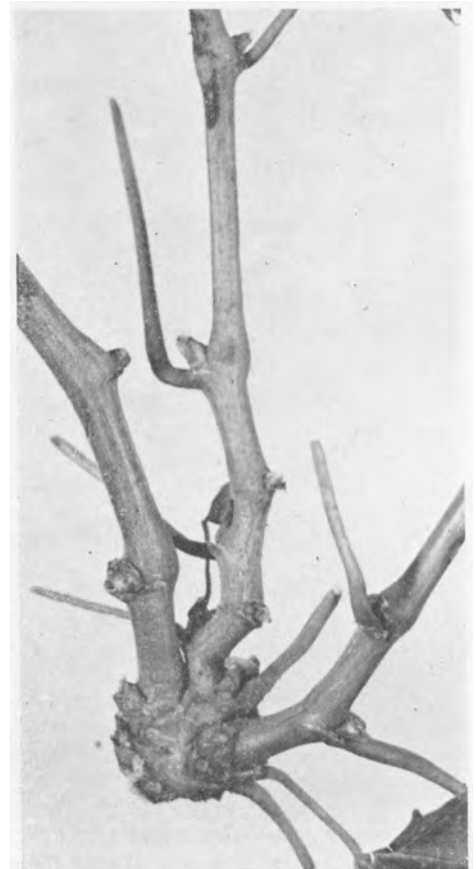
Frequently, while the mites are attacking the embryonic shoot inside of the bud—which produces short basal internodes the following year—they may extend their damage to the terminal growing point of the future cane. After this growing point is killed, the bud opens normally in the spring, the first six or

seven nodes develop in a stunted manner, but no more nodes are formed on that cane. Instead, some newly formed buds on the new cane grow and produce lateral shoots. Several such lateral shoots usually arise simultaneously on a decapitated cane. A bushy clump of canes, sometimes called witchesbroom may result.

## Zigzagged Shoots

This is a symptom of mild injury, which can only develop in cases where the internodes are at least one-half inch long. It consists of a sharp bending of the shoot at the node, to a 15 degree angle, then a sharp bend in the opposite direction at the next node. Many other influences which reduce the vigor of the vine may cause shoots to zigzag. In such cases, the condition is usually not confined to the first seven nodes. Bud mite induced zigzagging is limited to the basal seven nodes.

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Left: Injury caused by grape bud mite. Note the dwarfed primary cane in the center with vigorous shoots developed from lateral buds on the primary cane. Right: The primary cane is here reduced to a shapeless blob, from which three lateral shoots arise. Note the zigzag at the base of the central shoot.

Photographs on pages 3 and 4 by G. Dwight Worsham.

## Dead Overwintering Buds

In rare instances, it seems that the bud mites completely kill the overwintering buds, before the spring growth period.

In severe cases of this type of injury, 50% of the spurs may fail to put out new growth. The following winter, such vines have to be severely cut back with a saw, to establish new spurs. Several consecutive years of such damage may reduce the vine to a stump, without arms. The basal buds carry the heaviest infestations of mites and are the most severely damaged.

On cane-pruned vines such as Thompson Seedless, the killing of the basal overwintering buds makes pruning difficult the following year. On such vines growers have few good canes to select from in order to maintain the desired shape of the head. Other causes, especially a heavy winter freeze will similarly cause the death of the buds.

## Loss of Crop

The forms—the rudimentary bunches of grapes—are differentiated and visible in the bud in the winter. These forms are particularly susceptible to bud mite injury sometime before the bud opens.

When the microscopic forms are injured in the bud, they die and fall off, leaving scarcely a scar, and the cane which develops appears as fruitless as a sucker. The complete killing of forms

may occur on canes which show otherwise very mild symptoms of bud mite injury. Partial killing of the form may occur, which results in a small and ragged bunch of grapes.

## Damage Varies

All of these types of injury rarely occur in one vineyard. Usually three or four of these symptoms may be found concurrently. The most common symptoms are shortened internodes and absence of fruit.

The amount of bud mite damage in a particular vineyard, or even in a district, varies greatly from year to year. Often a severely damaged vineyard will be free from injury the following year. This is due to the fact that something annihilated the bud mites in the interim. The natural factors which control the bud mite are not well understood. Weather may play an important role, but it is thought that the chief factor consists of several kinds of large, predatory mites which feed on the bud mite.

The bud mite is microscopic in size and is too small to be seen by the unaided eye. They can be seen when magnified 14 times with a hand magnifying glass, but even at this magnification, they can be seen only by a trained observer. Their extremely small size has further delayed a correct diagnosis of the injury which they cause.

When vines are not treated with sulfur for the control of mildew, there usually develops on the lower leaf surfaces, some

white, fuzzy blisters which are concave on their lower surface. These were known long ago as erineae—singular erineum, a Greek word meaning woolly. At first, they were believed to be caused by a fungus. Later microscopic examination showed that they contained many small mites and these mites proved to be the cause of the erineae. These mites are now called, *erineum mites*.

Erineum mites overwinter on the grape vines under scales. In the spring they move out on the new, developing leaves and establish erineae. At about this time growers sulfur for mildew control and this effectively controls the erineum mite.

If, instead of crawling out on a leaf to establish a patch of fuzz in which to live, a mite should crawl into a next years bud and live there, it would escape the lethal sulfur dust. That is apparently what has happened. The result is a strain of mites which have new habits and which cause a different type of injury. The new strain is now called the bud mite. Entomologists have compared the bud mite with the erineum mite under the most powerful microscopes available and can find no structural differences whatsoever.

It is suspected that although the bud mite and the erineum mite are identical in appearance, they are physiologically different. Experiments were conducted which indicated that the bud mite could not produce erineum galls on the leaves, even in the absence of sulfur. Conversely, vines infested with erineum mites did not show bud and shoot damage typical of bud mites. It was concluded that the bud mite and the erineum mite are distinct physiological strains. The bud mite is believed to be an offshoot of the erineum mite which has been selected and propagated by the continual killing off of the erineum strain with sulfur.

Attempts to control the bud mite with chemicals have been handicapped because of the small size of the mite and because of its sporadic appearance and sudden disappearance in any particular vineyard.

From time to time, chemicals have been applied to portions of commercial vineyards in an attempt to control the bud mite, but almost without exception the nontreated vines showed no injury the following year, and it was concluded that the mites were annihilated by some unknown natural factor rather than by the chemical treatment. To date, there is no proven method of controlling this pest.

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**Injury caused by grape bud mite. Spur buds were completely killed. The only growth consists of fruitless suckers.**