

occur where vines are dusty or stressed. Proper irrigation scheduling reduces the water stress and also increases the humidity thereby reducing the mite population. High volume with high pressure water sprays help to reduce the dust and water stress, increase the humidity in vineyard and also dislodge the mites from foliage thereby temporarily reducing the mite populations.

Biological Control

Although some predators recorded in nature they do not play, significant role in keeping the heavy mite population buildup under check on grapes. The fungi *Beauveria bassiana*, *Verticillium lecanii*, *Hirsutella thompsonii* and *Pacilomyces fumosoroseus* are known to cause mortality in mites. These fungal pathogens can be used in the management of spider mites on grapevine.

Botanical Pesticides

Different neem formulations containing azadirachtin depending upon the strength of botanical viz., 1% @ 2.0 ml and 5% @ 0.5 ml/l can be sprayed.

Chemical Control

Effective management of mites on grapes relies primarily on the use of chemicals. Time of application is crucial in the management of mites. First application should be made on the appearance of mites. Several old and new molecules are available for the control of mites. They can be used in the non-cropping season. In the export grape gardens, indiscriminate use of chemicals leads to residue problem in the fruits and pre harvest interval (PHI) should be taken into consideration before spraying these chemicals on the exportable grapes.

Table 1. List of chemicals recommended to control mites

Insecticide	Dose	Pre Harvest Interval (PHI)
Dicofol 18.5 EC	2.50 mL/L	100 days
Fenpyroximate 5 SC	1.00 mL/L	60 days
Difenthurion 50 SC	0.80 mL/L	45 days
Sulphur 80 WP	2.00 gm/L	15 days
Abamectin 1.9 EC	0.30 mL/L	7 days
Azadirachtin 1%	2.00 mL/L	3 days

Note :

1. All the doses mentioned above are for high volume sprayer, where normal spray volume is 1000 litres/ha.
2. Recommendation of chemicals for the management of mites along with dose and PHI are of advisory nature for the good viticulture practices and therefore, not covered under any legal scrutiny.

Extension Folder No. 15

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Published by :

Dr. P. G. Adsule, Director
National Research Centre for Grapes, Pune - 412 307.

April, 2008

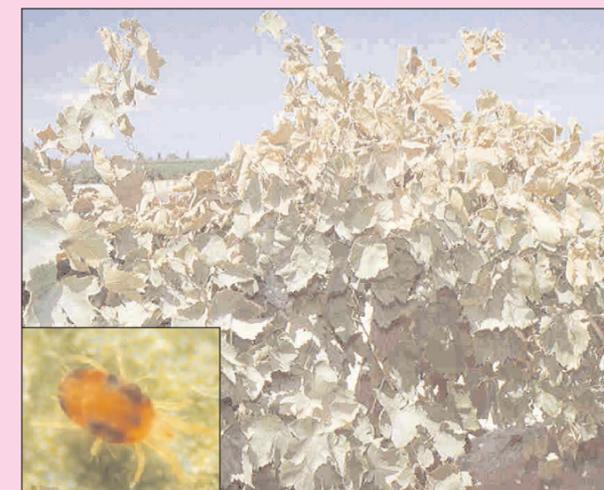
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Management of Mites on Grapes



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Mites pose an increasing threat to grape cultivation in certain grape growing areas in India causing heavy loss in the field.

MITE SPECIES

Six species viz., *Tetranychus urticae*, *T. cinnabarinus*, *T. neocaledonicus*, *Oligonychus mangiferus*, *O. punicae* and *Eutetranychus orientalis* are found causing damage to grapevine in India. Among them, the two spotted red spider mite *T. urticae* causes severe loss in Maharashtra and Andhra Pradesh.

LIFE CYCLE

Developing mites pass through egg, larval, protonymph and deutonymph stages. Female mites begin to lay eggs after 1-2 days singly on the under surface of leaves, particularly along the midrib and veins. Eggs are found on the upper surface of the leaves when the population levels are high. Eggs are also laid in its



webbing. Freshly laid eggs are minute measuring 0.1 mm white, spherical, transparent and appear like a water droplet. Later they change into dull white, gradually turn brown and then become transparent along sides with red spot visible before hatching. The female mite produces 30-50 eggs. Hatching takes place in 4-6 days. The newly hatched translucent larva has six legs. Dark spots appear soon after feeding on the dorsal side. The protonymph and deutonymphal stage has eight legs. The deutonymph stage is similar in appearance to an adult female but smaller. Nymphal period is 6-8 days. Life cycle completed in 10-14 days depending on weather conditions. Freshly emerged adult females are 0.5 mm long and devoid of spots but as the feeding begins, the spots become more distinct. Usually two large, diffuse spots appear forward. Adult spider mite females are reddish. Their pointed abdomens and smaller size easily recognize males. Adult mites live for about 15 days. Breeding is rapid in summer months. Development is greatly retarded in winter months. There are overlapping generations throughout the year.

NATURE OF DAMAGE

Both nymphs and adults suck the cell sap from lower surface of tender leaves causing the cells to collapse and die.



Mites on the lower surface of leaves



Yellowing of leaves due to mite attack



Webbing by mites



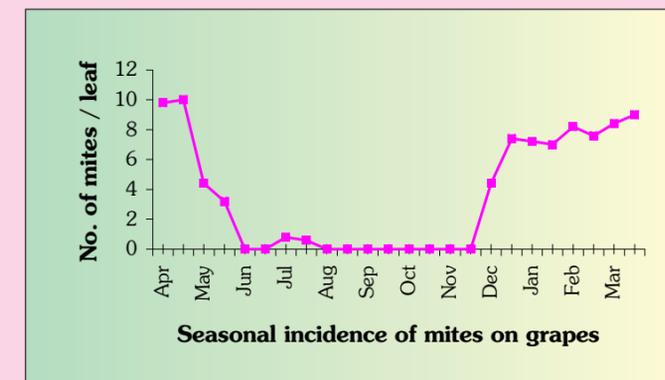
Browning of leaves due to mite attack

This damage is usually most conspicuous as pale colour spotting visible on the upper surface of the leaves. The infested leaves turn yellowish. In heavy infestations, the mites remove chlorophyll up to 70% leading into development of brown burnt patches on the infested leaves, which wither and finally dry. Discoloration of leaves leads to reduction in photosynthesis thereby affecting the vigour of the plants. Mites secrete a very fine, silk-like webbing which is usually obvious over the drying leaves, and later the mites move away to feed on growing shoots. Heavy leaf fall due to mite infestation causes berry ambering of such table grapes as Thompson seedless, because of exposure of bunches to sunlight. Severe infestation of spider mites results in delay in maturing of canes and ripening of bunches and reduction in sugar content thereby affecting the quality of grapes.

SEASONAL DEVELOPMENT

The mites become more active inof December and the mite infestation reached peak in April. Mite population was negatively

correlated with the minimum temperature and relative humidity. Watering practices affect the development of mite populations. Drought stressed plants are most prone to mite outbreaks. Pest is highly active during summer months. There is outbreak of mites in hot dry conditions. High humidity and rainfall reduces mite numbers. Wind is an important agent of mite dispersal.



MONITORING

Regular scouting is necessary to detect early infestations and also monitor the efficacy of control measures. Mites are small and difficult to see with naked eye. A crop scouting program includes the visual inspection. A 10x hand lens is a useful tool to detect mites on leaves. The mites, eggs and cast skins can be best seen by examining the under surface of the leaves. Appearance of yellow spots on the upper surface of the leaves is also the indication of mite incidence. Mites can also be sampled using the beat method whereby plant parts are beaten onto a white piece of paper or card. The dislodged mites from beaten plant parts can be seen then readily crawling on the paper.

MANAGEMENT

Cultural method

Sanitation is to be maintained for eliminating the sources of the mite infestation. Plant debris after pruning is also a source of both immature and adult mites and they should be destroyed. Weedy vineyards are most likely to contain more mites. Hence weeds and alternate host plants inside and near the outside the vineyard should be removed. Spider mite outbreaks frequently