LEAFROLL CONTROL STRATEGY

10.1 QUANTIFYING MEALYBUG IN VINEYARDS

The vine mealybug, *Planococcus ficus*, is a key pest in South African vineyards. It causes direct damage to infested plants, including infesting grape bunches (Fig. 1) and through the excretion of honeydew which promotes the growth of sooty moulds. In addition, it is the most important vector of grapevine leafroll virus.

Figure 1: Grapes infested with the vine mealybug (Image: M. Ferreira, University of Pretoria).

Natural enemies usually keep vine mealybug populations in check. However, in vineyards where they cause direct damage, effective management is important to keep mealybug populations below economic threshold levels. Mealybug management generally includes monitoring, biological control, ant control and as a last resort, chemical control. A single mealybug nymph is able to transmit leafroll virus to a healthy grapevine plant and therefore very effective mealybug control is essential. Monitoring can be used to determine if mealybugs are present.

10.1.1 Monitoring

Monitoring mealybug populations provide information on the presence of mealybugs in vineyards as well as on population sizes. Monitoring data are used to make management decisions, for example when and where control measures need to be implemented.

A combination of pheromone traps and physical plant inspections should be used. Pheromone traps can be used to determine where physical grapevine stem inspections are needed. Physical stem inspection indicates when management actions need to be taken.

10.1.2 Pheromone trapping and physical inspection

Pheromone trapping protocol

Pheromone traps

These traps make use of a synthetic female sex pheromone in their lures to attract winged male vine mealybugs. Vine mealybug pheromone capsules, yellow delta traps and sticky pads are commercially available. Depending on the product, pheromone capsules are replaced every three months.

Trap readings and trapping frequency

Adult winged male vine mealybugs are very small and stereomicroscopes are used to count males (Fig. 2).

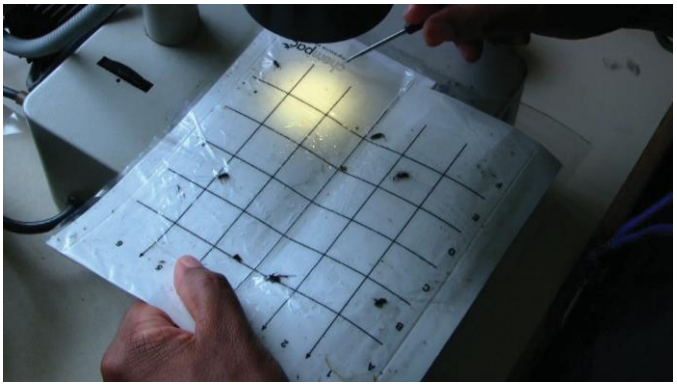

Figure 2: Counting adult male mealybugs on a sticky pad under a stereomicroscope (Image: R. Stolk, IGWS)

Pheromone trapping usually commences in October. When vine mealybug males are caught in traps, the number of males should be counted every second week until before harvest. If no vine mealybug males are found on the sticky pads, they can be left in the traps until the next sticky pad change is scheduled. Pheromone trapping should continue on a monthly basis after harvest in commercial blocks with a history of high vine mealybug infestation.

Out-of-season pheromone trapping should continue throughout the year at grapevine propagation and quarantine vineyard units.

Pheromone traps should also be placed in new vineyards planted on soil where old established and vine mealybug infested vineyards were removed.

One pheromone trap serves approximately 1 ha. If more than one trap is used, traps are placed 100 m apart to avoid interference.

The pheromone capsules are suspended just above the sticky bottom inside the trap by a piece of wire or an opened-up paper clip inserted through the roof of the trap (Fig. 3). Capsules covered with glue affect pheromone release and may not remain effective as long as they should. The trap is attached in or above the cordon region on the trellis wires (Figs. 4 & 5). The open ends of the trap should not be obstructed by leaves or shoots to allow for unhindered pheromone release and vine mealybug males to fly into the triangular centre of the yellow delta trap (Fig. 4).

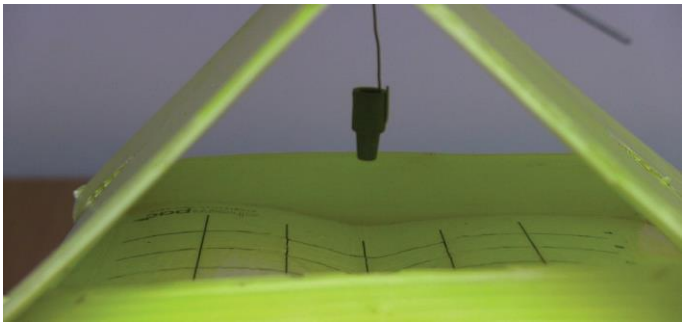

Figure 3: Pheromone capsule suspended above the sticky sheet at the bottom of a yellow delta trap. (Image: R. Stolk, IGWS)

Figure 4: Position of yellow delta sticky trap with Planococcus ficus (vine mealybug) pheromone lure. (Image: R. Stolk, IGWS)

Figure 5: Securely tied trap so it does not swing around in the wind. Open sides should not be obstructed by shoots or leaves. (Image: R. Stolk, IGWS)

Action thresholds, pheromone traps

- It is recommended that a trap count of 65 or more mealybug males over two weeks should be followed by physical stem inspection.

Physical inspection protocol

Physical inspection is essential when the action threshold for pheromone trap monitoring has been reached. It is recommended that for physical mealybug inspection a plan of the specific vineyard block with a clear indication of each row and the number of sections per row is drafted. Twenty sections of the block with five grapevines each, proportionately spread throughout the block, should be randomly selected. All five grapevines in each section should be inspected in those areas where new growth is found and the presence or absence of mealybugs on each grapevine be recorded. The total number of infected grapevines indicates the percentage of vine mealybug infection for that specific block.

Action thresholds, physical inspection

- Stem infestation rates of above 2 % warrant mass releases of commercially available natural enemies or control with chemicals.
- If infestation in the block is less than 2 % but there is a spot with heavily infested grapevines, a spot treatment can be applied to prevent infestation from spreading further.

Degree day model

A degree day model has been developed to aid in determining when mealybug monitoring should commence. This can be used in conjunction with mealybug monitoring to determine when management action should be taken.

Degree day model for the vine mealybug

Insects are cold-blooded and their development time is directly dependent on the ambient temperature. Heat accumulation, expressed as degree-days (°D), is widely used by entomologists to predict the outbreak of pest populations.

The rate of development of the insect is determined at different temperatures and the amount of heat units or °D required to complete one generation is calculated. Information resulting from the use of °D models can be used as additional inputs to manage the vine mealybug.

The vine mealybug requires 235°D to complete one generation. Cumulative °D are calculated for a grapevine-growing area on a weekly basis. When the number of accumulated degree days nears 235, it serves as an early warning signal to producers. This information together with mealybug monitoring can be used to make management decisions.

The number of °D required for development usually accumulates rapidly from early October in most areas, the same period when vine mealybug populations increase rapidly.

As soon as 235°D have accumulated at the beginning of the growing season, the movement of the first generation mealybug crawlers (first-instar nymphs) onto the foliage can be expected. If only vineyard inspection is used to monitor mealybug, this is the time to start inspection. If pheromone traps are also used for monitoring, physical vineyard inspection should commence as soon as 235°D have accumulated and the number of males per pheromone trap exceed the threshold value of 65 males per trap in a two-week sampling period.

To be notified by e-mail on the accumulated degree-days during the season, send williamsl@arc.agric.za an e-mail asking to be placed on the distribution list.

10.1.3 Conclusion

Pheromone traps are used for mealybug monitoring in the integrated management of vine mealybugs. The extreme sensitivity of these traps helps to detect low populations of this species in vineyards and the traps can therefore be used as a quarantine and early warning tool. Physical inspection is however necessary before control actions can follow. The degree-day model complements mealybug monitoring in making management decisions.

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Department of Viticulture and Oenology, Stellenbosch University
Author: Prof Gerhard Pietersen, University of Pretoria / ARC-PPRI