Multicolored Asian Lady Beetle

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The multicolored Asian lady beetle, Harmonia axyridis (Coleoptera: Coccinellidae), MALB, has recently become an economically significant contaminant pest in the wine-making process in the eastern and Midwestern United States. MALB is a predatory lady beetle native to eastern Asia that was first detected in Minnesota in 1994. Since its initial detection in the U.S., MALB has rapidly spread to cover much of the continental United States and parts of Canada.

Identification

MALB adults are approximately 0.5-0.8 cm long and round. The coloration of MALB adults ranges from orange to red with zero to 19 black spots, to black with red spots. The most distinguishing feature of adult MALB is the black "M"-shaped marking on the center of the pronotum (shield-shaped area behind the head). Eggs are yellow and oval-shaped. MALB larvae are alligator-shaped with black and orange markings, and are spiny in appearance.

Biology & Life Cycle

In the spring, MALB adults leave their overwintering sites and mate. Adults then seek out colonies of aphids. Eggs are laid in clusters of 20-30 on the underside of leaves near aphid colonies. Larvae develop through four instars. At temperatures near 80ºF, development from egg to adult requires about 18 days. The developmental rate will increase with increasing temperature.

At the end of the summer, MALB starts to prepare for winter by accumulating fat and sugar reserves. MALB adults move to vineyards, orchards, and other autumn ripening crops to feed on injured fruit (Koch and Galvan 2008). In the vineyard, grape clusters that have been injured due to physiological splitting, yellowjackets or birds are an attractive option for MALB. The proportion
of injured berries increases in the 2-3 weeks prior to harvest offering accessible feeding sites for MALB populations that are searching for fat and sugar reserves. This may be a primary explanation as to why grape growers in the Upper Midwest notice MALB on previously injured grapes near harvest.

Adult MALB migrate from fields and wooded areas to buildings in the fall. Ohio researchers have found that the fall migratory flights generally begin on the first day temperatures exceed 64°F following the first cold spell with temperatures dropping to near freezing. MALB seek out cracks or holes where they will spend the winter in clusters of few to many individuals. There are two generations of MALB each year.

Damage

MALB can be a devastating contaminant in wine production. MALB is difficult to remove from clusters of grapes during harvest. Subsequently, some of the MALB may be crushed with the grapes during processing. The flavor of the resulting wine can be tainted by the alkaloids contained in MALB. Adults tend to aggregate on clusters with injured berries just before harvest, and eventually they may be incorporated with the grapes during wine processing (Koch et al. 2004, Pickering et al. 2004). Once disturbed or crushed, MALB releases a yellow fluid, via reflex bleeding, that contains alkaloids and alkylmethoxypyrazines that are thought to be used as a defense mechanism or an aggregation pheromone. In addition, alkylmethoxypyrazines could be responsible for affecting wine flavor after MALB has been crushed along with the grapes. Tainted wine and the unacceptable taste associated with it could lead to economic losses for the wine industry in Minnesota and other states and provinces in the Great Lakes region.

Management

Cultural

Research from the University of Minnesota suggests that MALB have a preference for grape clusters that have existing damage from splitting, fungal disease, or grape berry moth feeding damage. Therefore, managing your vineyard to prevent these problems reduces the attractiveness and infestation of grape clusters by MALB. In addition,
varieties with a tight cluster structure tend to have high rates of splitting; therefore, variety choice may influence MALB infestations.

**Monitoring & Thresholds**

Early detection of movement of populations into vineyards can be accomplished by using yellow sticky traps. The sticky traps should be placed in the vineyard beginning about 4 weeks before harvest is anticipated.

In addition to monitoring movement into the vineyards, clusters should be examined to determine the need for an insecticide application. Because MALB can affect the flavor of the wine, sensory thresholds, which look at the interaction among flavor compounds in the wine, are being used. Currently, a suggested threshold is set at approximately 0.3 MALB/cluster, which would lead to 10% of wine consumers being able to detect MALB taint in the wine (Galvan et al. 2007b). However, this threshold can change depending on grape variety, wine style, and the grower’s risk perception (Galvan et al. 2007b). Since each wine grape variety has unique physical and chemical characteristics, each will probably have its own sensory threshold.

**Physical**

Removal of MALB prior to crushing the grapes is imperative to prevent tainted wine. Vigorously shaking grape clusters while harvesting may dislodge MALB adults, however, this may not be economically feasible due to the increase in harvest time. Wine that has been contaminated by MALB can have the taint remediated by adding oak chips, activated charcoal, and deodorized oak, however, it will not completely removed the taint from contaminated wine (Pickering et al. 2006b).

**Chemical**

To determine the need for insecticide application, a presence/absence sampling plan is recommended where the sampler selects 26 clusters per block or variety at random and determines the MALB infestation level. A cluster is considered infested if 1 or more MALB are found in the cluster. So once you see one MALB you don’t have to count any more MALB in that cluster because it is infested and you can move on to your next cluster, which allows the samples to be taken in less time. For a taint level in the wine where 10% of consumers could detect the taint, the treatment threshold would be 18% of the clusters infested with at least 1 MALB. The 18% of clusters infested is equivalent to a 0.3 MALB/cluster density the 18%, or 5 infested clusters out of the 26 sampled. (Galvan et al. 2007a). Products that provide good control of MALB can be found in the *Midwest Small Fruit Pest Management Handbook*. 
References


