IPM FOR CONTROL OF:

MYZUS PERSICAE

VERSION 1.0 MARCH 2025

IRAC

Insecticide Resistance Action Committee

This short document outlines Integrated Pest Management (IPM) tactics for controlling *M. persicae* in different cropping systems, which can be helpful in relation to insect resistance management. Though IPM is not IRAC International's primary expertise, IRAC will, where appropriate, seek to enable the dissemination of information on IPM options developed by research institutions, academia, or government agencies for certain crop-pest situations through our outreach channels. IRAC International encourages IPM in the context of resistance management (RM).

IPM is an approach to manage pests in an economically viable, socially acceptable, and environmentally safe manner (Dara, 2019). IPM tactics are based on science and can be roughly characterized as combinations of cultural interventions, host plant resistance, the use of natural enemies and the use of synthetic pesticides based on economic threshold, or genetically modified crops (GMO), where appropriate.

Accordingly, IRAC International encourages IPM in the context of resistance management (RM).

Cultural Controls

Sanitation is a commonly practiced tactic to keep the area in and around the crop free of host plants that allow aphid populations to persist.

The growth of volunteer plants between seasons is referenced as a "green bridge". Elimination of volunteer plants before sowing winter crops reduces the risk of pests and diseases surviving between seasons. A specific example from Australia of this approach was especially successful for controlling *M. persicae* from transmitting Turnip Yellows Virus in canola, in combination with an insecticide seed treatment. An additional foliar spray application is recommended, soon after aphids were detected using monitoring devices such as sticky traps. (Paddock Practices: Manage green bridge to reduce

virus/aphid risk in canola, (Paddock Practices: Manage green bridge to reduce virus/aphid risk in canola - GRDC).

The overwintering of green peach aphid on their winter host plants (*Prunus spp.*) is an opportunity for preventative control. Destruction of peach and apricot trees and treatment of trees with dormant oil and insecticide, have been used in the Western US to disrupt aphid population dynamics (Capinera, 2008). Aphids may also bridge seasons on vegetables grown in greenhouses. Like many other aphid species, green peach aphid populations have a heightened affinity for crops treated with nitrogen fertilizers.

Unlike for many other pests, crop rotation is a difficult strategy for *M. persicae* control because of its wide host range. If continuous cropping is implicated in retention of aphid populations, a crop-free period is needed (see Australia example above).

Intercropping on the other hand, has shown good control of green peach aphids such as legumes to protect broccoli, garlic to protect tobacco, mustard, rapeseed or tomato to protect common cabbage, oats or faba beans to protect potatoes, or again cabbage, celery, onion, and mustard to protect potatoes (Verheggen *et al.*, 2022 and Ali *et al.*, 2023).

Biological Control

The integration of natural enemies can be achieved through augmentative releases, as commonly practiced in greenhouses, or through conservation biological control, providing naturally occurring natural enemies with an environment which allows them to thrive.

Natural Enemies (macroorganisms)

A diverse range of up to 200 biocontrol agents from various families, have been identified as natural enemies of *M. persicae* populations (Ali *et al.*

2023). In greenhouses, the augmentative release of natural enemies is a common IPM strategy for controlling *M. persicae*. A well-established example is *Aphidius colemani* (Hymenoptera: Braconidae; Aphidiidae), a pan-tropical species of parasitoid, widely distributed in Africa, Asia, Australia, South America, and southern Europe, that parasitizes Aphididae, including *M. persicae*. It is commercially available for the biological control of aphids (Ward *et al*. 2021). A systematic release of *A colemani* for the control of *M. persicae* can be realized using so called banker plants. For this approach *A. colemani* is reared at high density on a different aphid species (*Rhopalosiphum padi*) on a host plant (barley) in pots not suitable for *M. persicae*. These pots can be shipped easily and then placed in greenhouses (Andorno & Lopez, 2014).

Several predators of aphids are well known and can be purchased mainly for releases in greenhouses, such as Chrysopid species (green lacewings) (Ward *et al*. 2021), the aphid midge Aphidoletes aphidimyza (Rice-Mahr *et al*., 2001), Coccinellid beetles (Obrycki *et al*., 2009), and hover flies (Syrphidae). At least one hover fly species, *Episyrphus balteatus* is commercially available.

Microbial control

Entomopathogenic fungi can be used for aphid control. The most studied fungi belong to the genera *Metarhizium*, *Beauveria*, *Lecancillium*, *Isaria*, and *Hirsutella*. The first four of them are also available commercially for applications in greenhouses. Spores of entomopathogenic fungi can be formulated as foliar spray formulations and be applied using standard spray equipment. (Ali *et al*. 2023)

Host Plant Resistance

Host plant resistance might not be targeted against green peach aphid directly, but against the disease vectored by the insect. As an example, in the

UK, varieties of canola are available which are totally resistant to turnip yellows virus, which means there is little need to control the aphids that transmit the virus when this variety is grown, as the aphids themselves rarely reach levels that cause direct damage to oilseed rape in the autumn (Dewa, 2017).

Successful IPM for *M. persicae*

Finally, successful IPM programs are making use of a variety of different tools, aiming to keep pest populations below a certain threshold. A successful implementation of IPM requires collaboration between all stakeholders at a regional level. This is discussed in more detail for organizing resistance management campaigns (ORGANIZING AN INTEGRATED RESISTANCE MANAGEMENT CAMPAIGN).

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