GREEN PEACH APHID
BEST MANAGEMENT PRACTICE GUIDE

SOUTHERN

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

BACKGROUND

Green peach aphid (*Myzus persicae* – GPA) has evolved resistance to a large number of insecticides globally – more than 70 active ingredients across a range of mode of action (MOA) groups. Within Australia, high levels of resistance to carbamates and pyrethroids are now widespread, as are low levels of resistance to organophosphates and neonicotinoids. Sensitivity shifts to sulfoxaflor (for example, Transform®) have recently been found in a small number of GPA populations in Western Australia, showing the potential for low-level resistance evolution to this active ingredient. For now, sulfoxaflor remains an effective foliar-applied chemistry for GPA control in Australia that needs to be used judiciously. Ultimately, the use of insecticides to control GPA in canola, pulses and horticulture crops places strong selection pressure on the evolution of resistance.

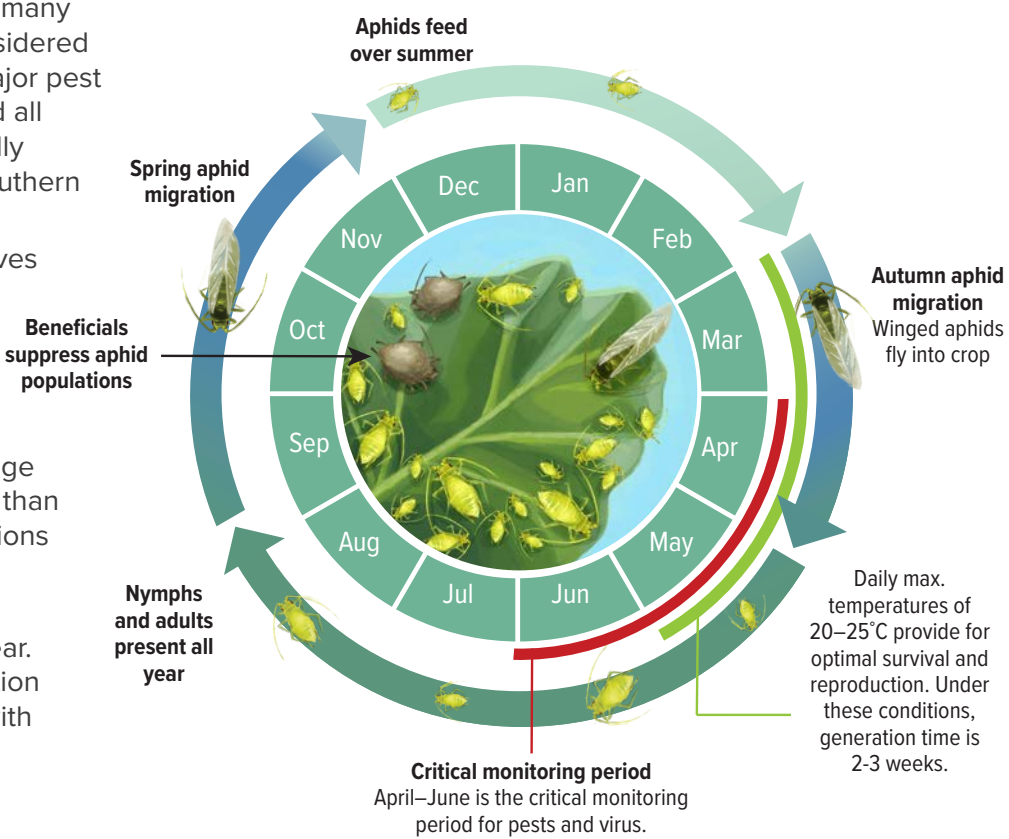
HOW TO USE THIS GUIDE

1. Become familiar with GPA biology and identification
2. Determine your risk for the season and follow the recommendations
3. Consider seasonally based best management practices and actions
4. Note key considerations for each season

In Australia, GPA attack canola and many pulse crops although canola is considered more vulnerable. GPA are also a major pest of horticulture crops. GPA are found all year round, with populations typically peaking in autumn and spring in southern grain-growing areas.

GPA feeds by sucking sap from leaves and flower buds. In grain crops, GPA's status as a disease vector spreading viruses that cannot be controlled poses a greater threat than any damage from direct feeding. Direct feeding damage caused from GPA is typically lower than other aphid species unless populations become large and crop plants are moisture stressed.

GPA has many generations each year. Under ideal conditions, the generation time can be less than two weeks, with females giving birth to live young.



GPA can transmit more than 100 plant viruses such as Turnip yellows virus (TuYV) (previously known as Beet western yellows virus). Aphids need to feed on infected plants to acquire TuYV and to transmit the virus to uninfected plants. Generally, it is when virus-infected aphids enter crops in autumn that drives severe epidemics. Therefore, correctly timed insecticide applications can prevent TuYV transmission. In any given year, many aphids will not be infected; the presence of GPA does not necessarily mean virus will be present.

Relatively few GPA individuals are required to transmit TuYV. Transmission can occur before GPA populations are noticed in the field – follow spray guidelines.

PHOTO: cesar

Green peach aphid.

Turnip yellows virus in canola.

PHOTO: JOOP VAN LEUR

GPA grows up to three millimetres long and varies in colour from shiny pale yellow-green to green, orange or pink. Adults are oval-shaped. Winged adults have a dark patch on the abdomen, while wingless adults are usually quite uniform in colour. Nymphs are similar to wingless adults but smaller in size. Unlike other species of aphids, GPAs prefer to inhabit the underside of the lower leaves of its host.

PHOTO: cesar

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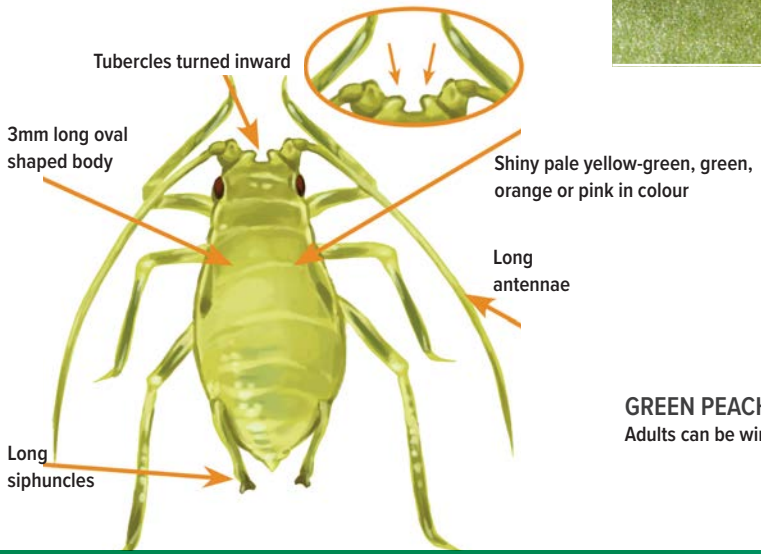


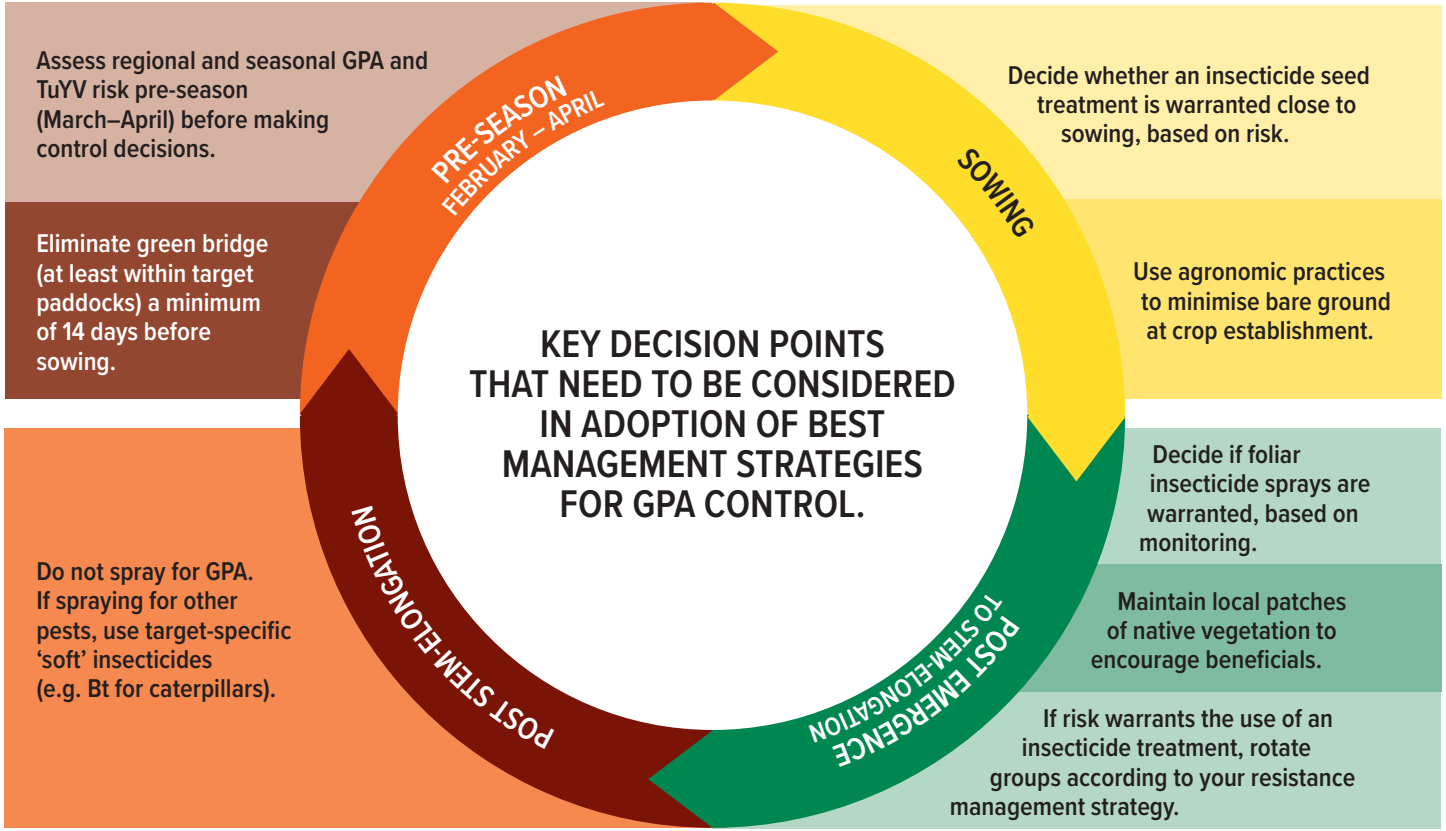
GREEN PEACH APHID
Adults can be winged or wingless.

PHOTO: cesar

FROM PRE-SEASON TO CROP ESTABLISHMENT

RISK FACTOR	LOW RISK	ELEVATED (MOD. TO HIGH) RISK	EXPLANATORY NOTES
Average annual rainfall in your cropping zone	Low-rainfall zone (<400mm per annum)	Medium to high-rainfall zone (>550mm per annum)	High-rainfall areas support a greater abundance of GPA/TuYV reservoirs.
Proximity to weedy or irrigated areas in the landscape	>3km from such areas	Adjacent (<3km) to such areas	Semi-permanent GPA host reservoirs increase your localised risk.
Seasonal rainfall patterns during the autumn pre-season period (February–April)	Below-average monthly rainfall (deciles <4)	Substantial monthly rainfall total (deciles 8-10)	High rainfall supports greater abundance of GPA/TuYV plant hosts and faster build up of aphid numbers.
Seasonal vegetation response (March–April)	Relatively little or short-lived green bridge	Substantial green bridge until at least mid-April	Where and when rainfall falls is important; prolonged green bridge increases risk.
Seasonal temperatures during autumn (April–May). NB: This factor is only relevant if green bridge available (see above row)	Below-average temperatures	Above average temperatures deciles (8-10)	High temperatures promote aphid development and flight activity.
Proportion of viruliferous GPA	<10% aphids infected with TuYV	>30% aphids infected with TuYV	Involves laboratory assessment that is not always accessible. Where inaccessible, use above methods to assess risk.

NB: For each row, risk can be considered 'Normal' level if not 'Low' or 'Elevated'.
Overall risk assessment should be based on the balance of low vs. elevated risk factors.


Assess regional and seasonal GPA and TuYV risk pre-season (March–April) before making control decisions.
Eliminate green bridge (at least within target paddocks) a minimum of 14 days before sowing.
PRE-SEASON
FEBRUARY – APRIL
SOWING
Decide whether an insecticide seed treatment is warranted close to sowing, based on risk.
Use agronomic practices to minimise bare ground at crop establishment.
KEY DECISION POINTS THAT NEED TO BE CONSIDERED IN ADOPTION OF BEST MANAGEMENT STRATEGIES FOR GPA CONTROL.
POST EMERGENCE TO STEM-ELONGATION
Decide if foliar insecticide sprays are warranted, based on monitoring.
Maintain local patches of native vegetation to encourage beneficials.
If risk warrants the use of an insecticide treatment, rotate groups according to your resistance management strategy.
POST STEM-ELONGATION
Do not spray for GPA. If spraying for other pests, use target-specific 'soft' insecticides (e.g. Bt for caterpillars).

Key actions

1. Assess regional and seasonal GPA and TuYV risk pre-season (February–April) before making control decisions.
2. Eliminate green bridge (at least within target paddocks) a minimum of 14 days before sowing.

LOW RISK GPA

- Continue monitoring.

MODERATE RISK GPA

- Ensure green bridge is managed to reduce risk to crop when sown.

HIGH RISK GPA

- Area-wide management of green bridge will be important to manage risk leading into sowing.
- Consider crop rotation choices if risk of outbreak is difficult to manage. Cereal crops are not impacted by GPA as they are not a preferred host.

Considerations

- Consider the regional risk of aphid build-up (February–April); discuss with regional agronomists.
- GPA weed hosts close to crops will be the greatest source of aphid and TuYV risk.
- GPA colonises a wide range of broadleaf weeds and crops including brassicas (Wild radish/volunteer canola, Forage rape), Marshmallow, Shepherd's purse, Blackberry nightshade, volunteer pulses and *Lepidium* spp.

GPA colony on the under-surface of leaf and a mummified aphid from parasitic wasp.

PHOTO: BCG

Key actions

1. Decide whether an insecticide seed treatment is warranted close to sowing, based on risk.
2. Use agronomic practices to minimise bare ground at crop establishment.

LOW RISK GPA

- Do not apply seed treatments where this is in your control.
- Sow earlier to reduce risks from other pests (e.g. slugs, weevils, mites).

MODERATE RISK GPA

- Apply seed treatments – consider leaving untreated strip to observe differences.

HIGH RISK GPA

- Apply seed treatments.
- Delay sowing to avoid exposure of establishing canola in line with peak aphid flights.

Considerations

- Seed treatment is standard on canola seed at present. This makes withholding seed dressing where risk is low challenging for seed purchased commercially, but it should be considered when using retained seed.
- To delay resistance, insecticides should only be used in higher-risk scenarios.
- Where possible sow into standing stubble and select hybrid varieties that achieve early crop establishment and canopy closure.
- Aphids tend to fly into crops (or parts of crops) when they see plants against the backdrop of exposed earth; they are more attracted to open rows of plants with bare earth visible between crop rows.

Stubble retention and establishing canola crop.

PHOTO: BCG

Key actions

1. Use monitoring to decide if insecticide sprays are warranted.
2. If risk warrants the use of an insecticide treatment, rotate groups according to resistance management strategy. (see 'Further resources', page 12).
3. Maintain local patches of native vegetation to encourage beneficials.

LOW RISK GPA

- Do not spray.

MODERATE RISK GPA

- Consider a border spray with an insecticide to delay the build up of GPA and maintain beneficial insects.

HIGH RISK GPA

- Choose most appropriate insecticide based on resistance levels and rotation requirement.
- Don't use the same product (MOA) more than once.

Considerations

- Consider applying insecticides when ALL of the following conditions are met:
  - Canola crop is before stem-elongation stage;
  - Regional/seasonal risk is high; and
  - GPA is present – conduct monitoring or use sticky traps for warnings of aphid flights.
- Seed treatments will protect emerging seedlings from early GPA colonisation; however, duration of control may be variable depending on seasonal conditions, resistance and product used.
- Virus impact on yield is highest when transmission occurs before stem-elongation.
- Ensure spray applications achieve good coverage by using correct nozzles, high water volumes and appropriate ground speeds.
- Many beneficial insects (such as aphid parasitoids) seek refuge and nectar sources in native vegetation. Vegetation diversity is important.

Key actions

1 Do not spray for GPA.

2 If spraying for other pests, use target-specific 'soft' insecticides (for example, Bt for caterpillars).

Considerations

- Although they may be found in crops at later stages, numbers are usually insufficient to cause significant yield loss through feeding, and virus transmission is unlikely to impact crop performance.
- Keep in mind the impact of sprays on target and non-target pests. Everything you apply may have unintended targets that add to resistance selection pressure. Soft insecticides reduce selection pressure on both beneficials and non-target species.

LOW RISK GPA
- Do not spray for GPA.

MODERATE RISK GPA
- Do not spray for GPA.

HIGH RISK GPA
- Do not spray for GPA.

Mummified green peach aphid suggesting presence of parasitic wasps .

PHOTO: BCG

GPA – green peach aphid

Green bridge – presence of green plant material in the non-cropping phase of broadacre farming practices that can be host to out of season pests and diseases

MOA – mode of action; how a chemical compound works within the target species and the biological pathway(s) it disrupts

Nymph – an immature form of an insect that does not change greatly as it grows

Seed treatments – chemical productions applied to seed prior to sowing for management of establishment pests

Soft insecticide – an insecticide that has fewer impacts on non-target organisms. Also called 'selective insecticides'

TuYV – Turnip yellows virus

Viruliferous GPA – virus-carrying green peach aphid. These aphids have the potential to transmit the virus to host plants

NOTES

NOTES

References / Further resources

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GPA PestNote – www.cesaraustralia.com/sustainable-agriculture/pestnotes.

GPA Resistance Management Strategy – www.grdc.com.au/GPAResistanceStrategy.

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