

Pest control options post-flowering

As we reach the end of flowering, it is important that we;

- a. Prevent pest damage to the new crop .
- b. Make every spray decision carefully, so as not to disrupt harvest plans for our remaining crop.

Good information

Chemical choice has become complex. Talk to your packer representative, your supplier / spray contractor or Colin, Jerome and Danni to discuss choices.

Recommendation

Print out the AIC Table of With-holding periods (WHP) from the NZ Avocado website—use it to help select appropriate chemicals, it's an essential reference. With-holding periods should be the first consideration when selecting chemicals.

Korea

The most difficult market to make allowance for is Korea (also one of our most lucrative). We could be packing for Korea up until Week 2 and until then, the Korea WHP should be the first consideration when choosing a chemical. All chemicals with the exception of Maldison (Fyfanon), Methoxyfenozide (Prodigy), Spinosad and Pyrethrin have a NIL residue requirement for Korea (hence the extensive AVOCO residue testing program).

China

You will now be monitoring for Fuller's Rose Weevil, Flower Thrip, Long-tailed Mealybug and White Wax Scale. On the last page of this document, you will find a table outlining actions for pests of concern to China. Any fruit going to China must meet these requirements. Watch the development of the Official Assurance Program and any further changes to Avogreen carefully.

The Heavies

We are actively discouraging the use of Attack, Mavrik, Lorsban and Carbaryl. These products are highly residual in fruit tissue and will rule your crop out for certain markets. They are also broad-spectrum insecticides and likely making pest control (especially SSM) more difficult in the long run by wiping out beneficial insects.

Copper

Please apply copper (from now if you haven't started already) on a monthly basis in your orchard. This will protect the fruit from fungal infections (rots) and reduce fungal inoculum in the orchard. The proof that copper improves export fruit quality is emphatic and as export growers this is an important / essential part of our fruit quality strategy. Our industry is working hard on developing a fungicide program with reduced dependency on copper and until this becomes available we are encouraging our growers to monitor soil Total Copper levels. Colin, Danni and Jerome are available to comment on your result if you wish to discuss.

Control Options by Pest

Leafroller

Spring

Summer

Autumn

Winter

Control should be a priority at the end of flowering and through the summer months.

Names	Active Ingredient	Withholding period	Maximum applications	Mode of Action	Notes
Prodigy Genoxy Talent	Methoxyfenozide	14 day	3	Enters larval bloodstream by contact and ingestion, inducing a premature and fatal moult.	Very effective. Not compatible with mineral spray oils.
Altacor	Chorrantraniliprole	14 day WHP except Korea (180 days)	2	Acts primarily as a larvicide.	<i>Best to avoid for Korea-bound fruit.</i> Very effective and bee-safe (provided applied at night).
Proclaim Announce	Emamectin benzoate	3 day WHP (residue test for Korea)	6	Moves into young leaves and taken up by feeding leafrollers.	Very effective.
Success	Spinosad	14 day	-	Contact and ingestion activity. Affects insect nervous systems. Larvae stop feeding.	
Comic Mimic Approve	Tebufenozide	21 day except USA and Korea (250 days)	4	Induces premature moult in larvae. Insects stop feeding.	Best to avoid for Korea-bound fruit.
Sparta	Spinetoram	14 day (residue test for Korea)	-	Contact and ingestion activity. Exposed larvae stop feeding.	Two label rates (higher rate to control both) 20ml per 100 litres for Leafroller 40ml per 100 litres for Greenhouse thrips
BioBit Delfin Bactur	Bacillus thuringiensis	0 day	-	When ingested, the bacterial toxin destroys the larval gut.	The addition of a wetter/sticker is recommended. Avoid spraying in cold conditions.

Greenhouse thrips (GHT)

Spring

Summer

Autumn

Winter

Usually peaks late Summer-Autumn however there are many cases of thrips overwintering. It is worth controlling early. Thrips like to feed between touching fruit—good coverage is essential to reach these places.

Names	Active Ingredient	Withholding period	Maximum applications	Mode of Action	Notes
Calypso Alpasso Topstar Commend	Thiacloprid	14 day except Korea (35 days and residue test)	-	Acts as an acute contact and stomach poison.	Essential that a second spray is applied within 14-21 days of the first spray to achieve control.
Fyfanon	Maldison	7 day	2	Disrupts nervous system function.	This is an organophosphate and will impact beneficial pests.
Sparta	Spinetoram	14 day (residue test for Korea)	-	Contact and ingestion activity. Exposed larvae stop feeding.	40ml per 100 litres for Greenhouse thrips
Pyganic ZETaPY	Pyrethrin	1 day (14 day for HK, TW, TH)	-	Contact action.	Good coverage is essential. Apply late in the day as chemical deteriorates quickly in UV light.
Dew	Diazinon	14-60 day (check AIC list)	2	Contact and stomach activity against a wide range of insect pests.	

Six Spotted Mite (SSM)

Spring

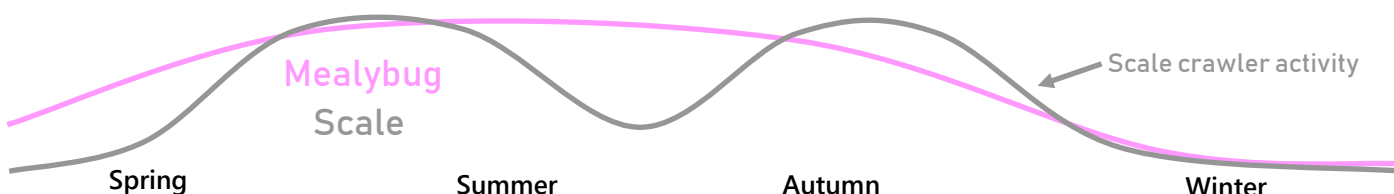
Summer

Autumn

Winter

Although mites do not directly cause cosmetic fruit damage, SSM control is a pivotal element in tree health and productivity. Infestations cause leaf drop and can place severe strain on trees especially if occurring around flowering or if root rot is present.

Names	Active Ingredient	Withholding period	Maximum applications	Mode of Action	Notes
Paramite	Etoxazole	14 day except 63 days Japan and Korea (residue test for Korea)	1	Mite growth regulator. Causes adults to lay sterile eggs and stops existing eggs and nymphs developing. Has translaminar activity.	Should be applied when mite numbers are rising. Can be combined with abamectin or milbermectin when numbers are high.
Avid Verdex Invert Abamax Hortcare Abamectin	Abamectin	14 day (residue test for Korea)	3	Moves into young leaves, where it is taken up by feeding mites.	Best used to control mites between Paramite applications. Effective when applied twice, two weeks apart.
Mite Mec	Milbermectin	14 day (residue test for Korea)	3	Moves into young leaves, where it is taken up by feeding mites.. Ovicidal (kills mite eggs).	Best used to control mites between Paramite applications. Should only require one application.
Excel Oil DC Tron Enspray 99	Mineral Oil	0 day	-	Oil works as a smothering agent, blocking the mites breathing spiracles.	Heavily dependent on good coverage. The drawback is that it can block leaf stomata and cause leaf phytotoxicity.



Long-tailed mealybug and armoured scale now need to be monitored under the AvoGreen protocol. Growers intending to send fruit to China may need to take action when these pests are found on orchard.

Names	Active Ingredient	Withholding period	Maximum applications	Mode of Action	Notes
Calypso Alpasso Topstar Commend	Thiacloprid (Mealybug and Scale)	14 day except Korea (35 days and residue test)	-	Acts as an acute contact and stomach poison.	Label claim for Scale and Mealybug in other crops. Contact NZ Avocado for a dispensation.
Excel Oil DC Tron Enspray 99	Mineral Oil (Scale)	0 day	-	Oil works as a smothering agent.	Heavily dependent on good coverage. The drawback is that it can block leaf stomata and cause leaf phytotoxicity.
Dew	Diazinon (Mealybug and Scale)	14-60 days (check AIC list)	2	Contact and stomach activity against a wide range of insect pests.	A 'Heavy' chemical which will also impact beneficials. A last resort if infestations become heavy—seek advice before using,

Fullers Rose Weevil and **Flower Thrips** are now monitored under the AvoGreen protocol. These are not considered pests on mature orchards, however actions may need to be taken on orchards exporting to China. Contact NZ Avocado for guidance.

The 'Heavies'

We are actively discouraging the use of Lorsban, Attack, Mavrik, and Carbaryl for the following reasons:

- These products are highly residual in fruit tissue and will rule your crop out for certain markets.
- They are broad spectrum and likely make pest control more difficult in the long term by wiping out beneficial insects.

However, since they are registered for avocados, they can be considered under exceptional circumstances. Please seek advice before applying any of these chemicals.

Lorsban (Chlorpyrifos) has a WHP of 35 days for all markets except Korea which requires 210 days. This is an organophosphate with a broad spectrum kill capacity, but not a long-lasting effect. Because it is cheap, it has been popular amongst growers however we caution against it if you are trying to control mites as beneficial insect populations are heavily impacted and SSM can increase again very quickly after a Lorsban application. If you insist on using it, do so only once, but not while picking for Japan and Korea and not after end-January. Never add oil to Lorsban.

Sevin Flo (Carbaryl) acts against Leafroller, Thrip and Scale. This chemical has a 10 day WHP. Residue-test for Korea.

Attack and Mavrik are still registered for use on avocados however they leave such long and unpredictable residues that we discourage their use entirely. Please do not use these products on Avoco export fruit unless you have discussed with us first.

Good Spraying Technique

There is an old saying in pest control circles: "It doesn't matter what you miss them with" in other words you can use the best chemical, but if it does not reach its target you will not control the pest. Avocados are notoriously difficult to wet thoroughly because of their size, canopy density and large leaves with waxy cuticles. Additionally, the pests have remarkable strategies to avoid control: mites live on the underside of leaves, leafroller curl leaves around themselves and thrips skulk in the area where fruit touch. Use a well-calibrated, air-blast sprayer set up to maximise coverage.

Oil and Wetters

The efficacy of every pesticide registered for avocados (exception Paramite) is enhanced if a non-ionic wetting agent is added to the mix at label rates.

Oil is not a wetter and can block leaf stomata at crucial times, causing leaf damage (phytotoxicity). It can be used to 'dampen down' SSM but then should be applied during the cold winter months. Most importantly, inclusion of oil can cause some pesticide residues to linger longer than normal. Apply on its own or with copper.

China

The table below outlines the actions for pests of concern to China. Orchards with fruit destined for China must:

- Read and understand the China OAP document, and comply to this document.
- AvoGreen monitor regularly from fruit-set until the crop is harvested.
- If the action threshold is exceeded during any monitoring round, the required action must be completed.
- If the action chosen is a re-monitor, the required action following re-monitoring must be completed.

Pest	Monitoring sites per tree	Action Threshold	Required Action when action threshold exceeded	Required action following re-monitoring
Leafroller	5 fruit OR 10 shoot	2% 2%	Apply targeted agrichemical within 28 days OR Re-monitor within 14 days to determine changes in pest population	If percentage has increased from initial monitoring round, apply targeted agrichemical within 28 days.
Thrips (Greenhouse thrips and Flower thrips)	5 fruit sites	2%	Apply targeted agrichemical within 28 days OR Re-monitor within 21 days to determine changes in pest population	If percentage has increased from initial monitoring round, apply targeted agrichemical within 28 days.
Scale (Armoured Scale, White Wax Scale and Chinese Wax Scale)	10 fruit OR 10 leaf	6% 4%	Apply targeted agrichemical during peak crawler activity (Nov-Jan or March-May) OR Re-monitor within 28 days to determine changes in pest population	If percentage has increased from initial monitoring round, apply targeted agrichemical during peak crawler activity (Nov-Jan or March-May)
Longtailed Mealybug	10 fruit OR 10 shoot/leaf	2% 2%	Apply targeted agrichemical within 28 days OR Re-monitor within 28 days to determine changes in pest population	If percentage has increased from initial monitoring round, apply targeted agrichemical within 28 days.
Fullers Rose Weevil	Shoots and leaves	Presence of leaf damage.	Re-monitor within 28 days to determine changes in pest population	If visible presence of beetle has increased and/or damage has become more widespread from the initial monitoring round, apply targeted agrichemical within 28 days.