Crop protection options for aphid management and integration into control programmes

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WHAT I WILL COVER

- **Approved insecticides**
  - **Conventional**
  - **Bioprotectants**
- **Products exempt from regulations**
- **Integrating products within an IPM programme**
- **Summary**

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Approved products - conventional

HTA

CAUSAL ORGANISM(S)	EXAMPLE CONTROL PRODUCT NAME AND MAPP NUMBER	ACTIVE SUBSTANCE(S) (a.s)	IRAC CODE	COMPATIBILTY WITH BIO CONTROLS	MODE OF ACTION	FIELD / PROTECTED	FIELD RATE (Max. approved rate listed)	PROTECTED RATE (Max. approved rate listed)	ERADICANT / PROTECTANT	APPROVAL STATUS AND EXPIRY DATE*	NUMBER OF APPLICATIONS	MAXIMUM TOTAL DOSE	SPECIFIC RESTRICTIONS	COMMENTS
Aphids (*Aphis gossypii*, *Macrosiphum euphorbiae*, *Myzus persicae* and various other species)	Aphox (MAPP18562)	Pirimicarb 500g/kg	1A	MS	C, F, Tr	P	280g/ha	280g/ha	E	EAMU 4196/19 - 15/09/2027	1	-	Container-grown crops only. Use in a min water volume of 300L/ha (max concentration of 50g/100L)	Application rate is too low for *Myzus* and other species, OK as tank mix with Mainman
	Batavia (MAPP18449)	Spirotetramat 100g/L	23	-	S, Trl	F/P	750ml/ha	750ml/ha	E	EAMU 1267/22 EAMU 1268/22 - 31/01/2027	2	-	For outdoor crops: only apply after flowering has finished. For protected crops: 14 days before flowering or following flowering. 39 days handling restriction for protective clothing	Risk of phytotoxicty to crops, check on a small scale before commercial application
	Decis Protech (MAPP16160)	Deltamethrin 15g/L	3	H	C	F/P	500ml/ha	1.2L/ha	E	EAMU 1662/13 EAMU 3553/22 - 15/02/2029	3	-	For outdoor crops: SRSU gloves for 6 weeks handling restrictions. Do not apply with handheld equipment. Buffer zones based on crop height. For protected crops: SRSU gloves for 13 weeks handling restrictions. Use of respiratory equipment and managers must complete a thermal comfort checklist	Risk of phytotoxicity to some crops
	Gazelle SG (MAPP20034)	Acetamiprid 200g/kg	4A	H	C, S, Tr	F/P	250g/ha	500g/ha	E/P	On label - 24/01/2027	1 (2)	-	Do not apply with handheld equipment under protection. Managers must complete a thermal comfort checklist. Not to be used on field-grown, non-bulb, cut flowers and hardy nursery stock. Protective clothing and SRSU gloves for 10 weeks after treatment	14 day spray interval for protected crops. For use on container-grown ornamentals only less than 50cm. Only 1 application to outdoor crops
	Hallmark WZT (MAPP12629)	Lambda-cyhalothrin 100g/L	3	H	C	F/P	90ml/ha	50ml/ha	E	EAMU 2944/08 - 09/09/2099	4 (3)	270ml/ha/yr	A min interval of 14 days must be observed between applications	
	Mainman (MAPP13123 and 20214)	Flonicamid 500g/kg	29	MS	S	F/P	140g/ha	140g/ha	E/P	EAMU 0045/13 EAMU 2832/22 - 28/02/2029	3	-	An interval of 21 days must be observed between treatments	Very slow acting but long lasting, lower water volumes work better, good in mixtures with contact insecticides
	Sequoia (MAPP18938)	Sulfoxaflor 120g/L	4C	MS	S	P	-	400ml/ha	E/P	On label - 18/02/2028	2	400ml/ha/yr	No handling for 8 days, vents, doors and other openings must be closed during and after application until the applied product has fully settled	Same group as Gazelle, don't abuse. 1 application at 400ml/ha or 2 x 200ml/ha. Separate whitefly and aphid recommendations. Latest time of application 1 day before harvest
	Sumi-Alpha (MAPP18637)	Esfenvalerate 25g/L	3	H	C	P	-	50ml/100L	E	On label - 09/09/2099	2	-	Max 1,200L/ha water volume	

Aphox

- Better at large aphid species
- Use low water volumes, ideally 400-500L/ha
- Vapour activity – best applied mid-morning
- Contact, translaminar, and vapour
- Good in a tank mix with Mainman for difficult to control species – peach potato and melon cotton aphids
- Limited use
- Compatible with biological control
- Good crop safety
- Good in mixtures

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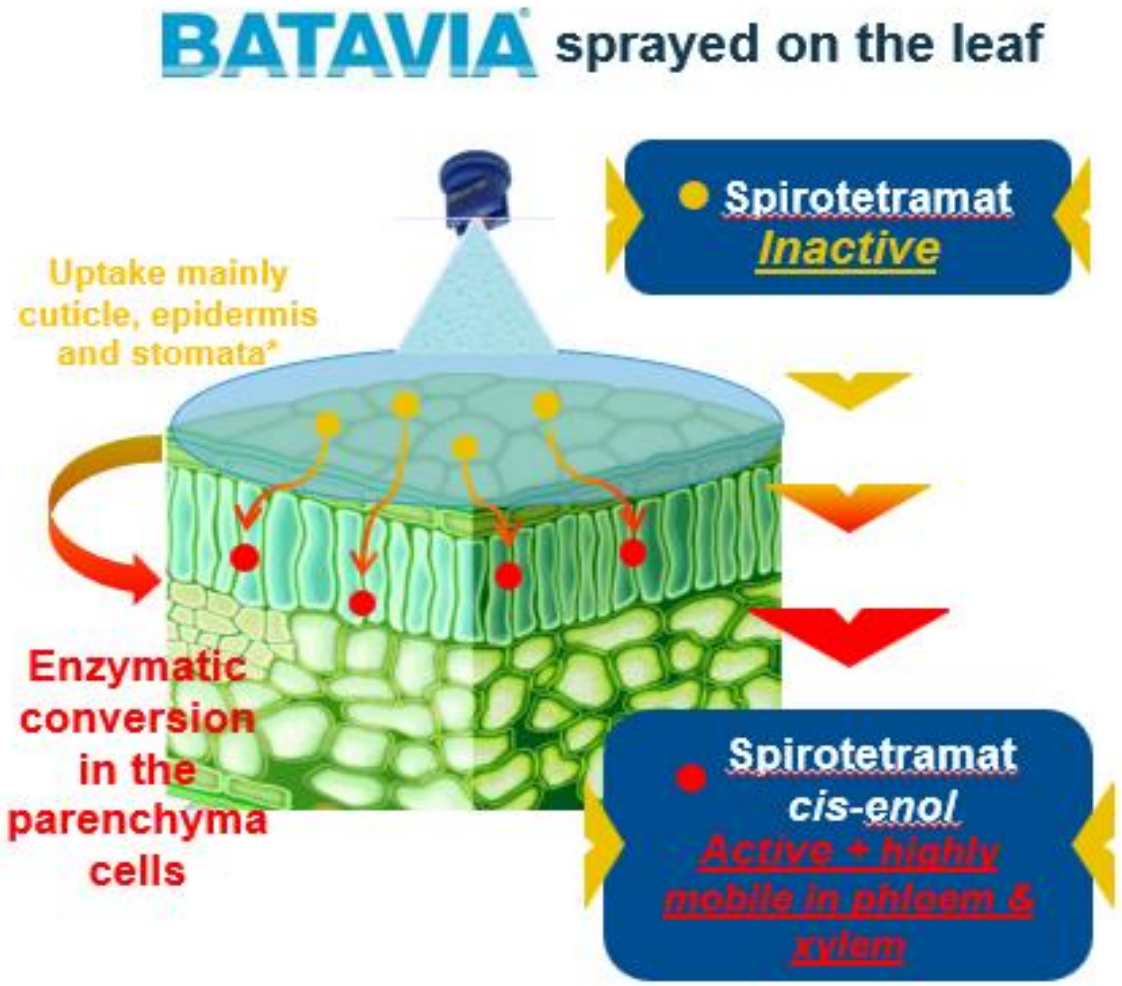
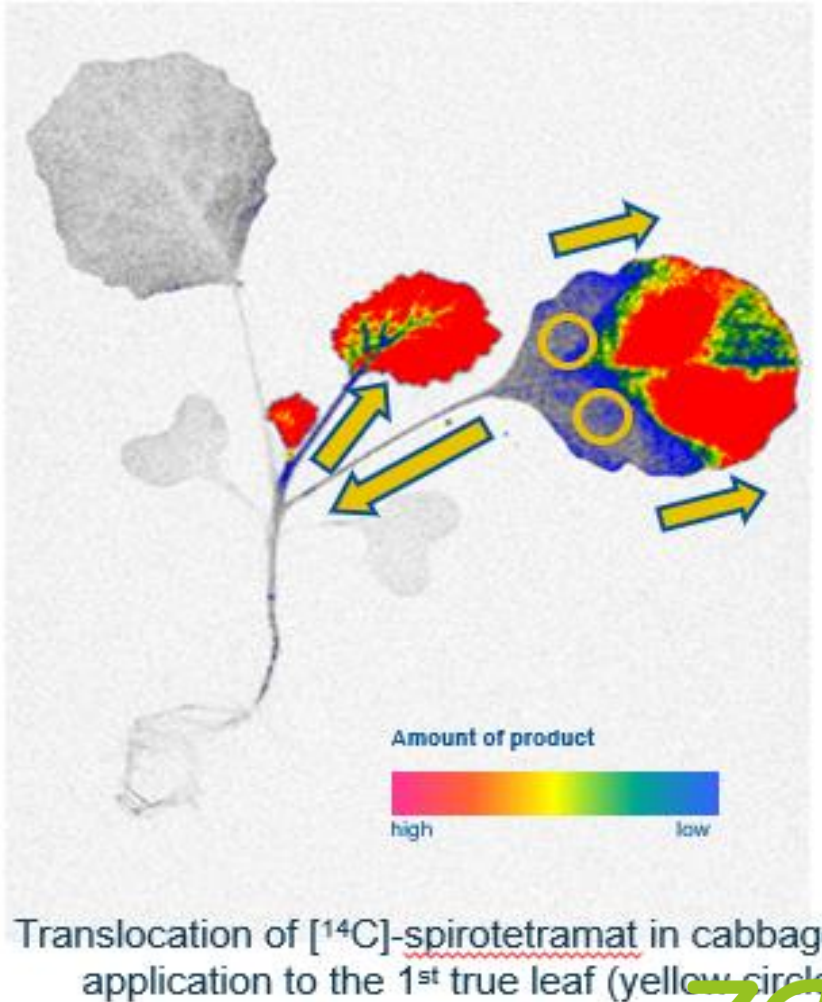
Batavia





Translocation of [^{14}C]-spirotetramat in cabbage after application to the 1st true leaf (yellow circles)

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Batavia

- Can provide a long-lasting effect
- Effective on all aphid species without exception
- Translocation and systemic
- Lifecycle breaker, NOT a knockdown product!
- Actively growing crops
- DO NOT MIX (no exception)
- Useful for scale insects, mealy bugs, and other sap sucking pests
- Good beneficial profile
- Do not use on flowering crops
- Can be phytotoxic

Alstroemeria spp., Begonia spp., Cyclamen spp., Euphorbia spp., Ficus spp., Fuchsia spp., Hedera spp., Hydrangea spp., Impatiens spp., Pelargonium spp., Populus spp., Salix spp., Saintpaulia spp., Tilia spp., Quercus frainetto.

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Pyrethroids – Decis, Hallmark Zeon, Sumi-Alpha

- Persistent under low light levels, especially in tunnels
- Contact ONLY but some anti-feedant effect
- Broad spectrum, but many resistant populations exist
- Abused too much by some of the smaller grower/retailers
- Useless on aphid species with sub canopy habits – shallot, lupin, and helichrysum aphids for example
- Risk of phytotoxicity under hot and sunny conditions
- Only use where you have more than one pest on same crop – i.e. aphids + caterpillars etc.
- Hallmark Zeon a better choice
- Incompatible with biocontrol long term

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Gazelle SG

- Effective on all aphid species except woolly aphids and root aphids
- Fast acting contact, systemic translaminar
- Good persistency – 10-14 days
- Knockdown and lifecycle breaker
- Side effects on other sap sucking and chewing pests
- Do not rely on for whitefly control – too weak for this
- Some concerns over decline in efficacy
- Can help with reducing virus transmission
- Good crop safety
- Does benefit from adjuvant use
- Compatible with biocontrol, but must leave time between introductions

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Mainman

- Lifecycle breaker
- Systemic only with high persistency (up to 21 days)
- Movement only upwards
- Slow to work but effective on all species
- Taken up by roots, stems, and leaves
- Side effects on other sap sucking pests
- Good tank miscibility
- Good crop safety
- Compatible with biocontrol

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Sequoia

- Similar to Gazelle SG, but considered more effective
- Systemic, contact and translaminar with good persistency (up to 14 days)
- Movement only upwards
- Fast acting and effective on all aphid species
- Taken up by leaves
- Side effects on other sap sucking pests
- Good tank miscibility
- Good crop safety
- Compatible with biocontrol, but must leave time between introductions

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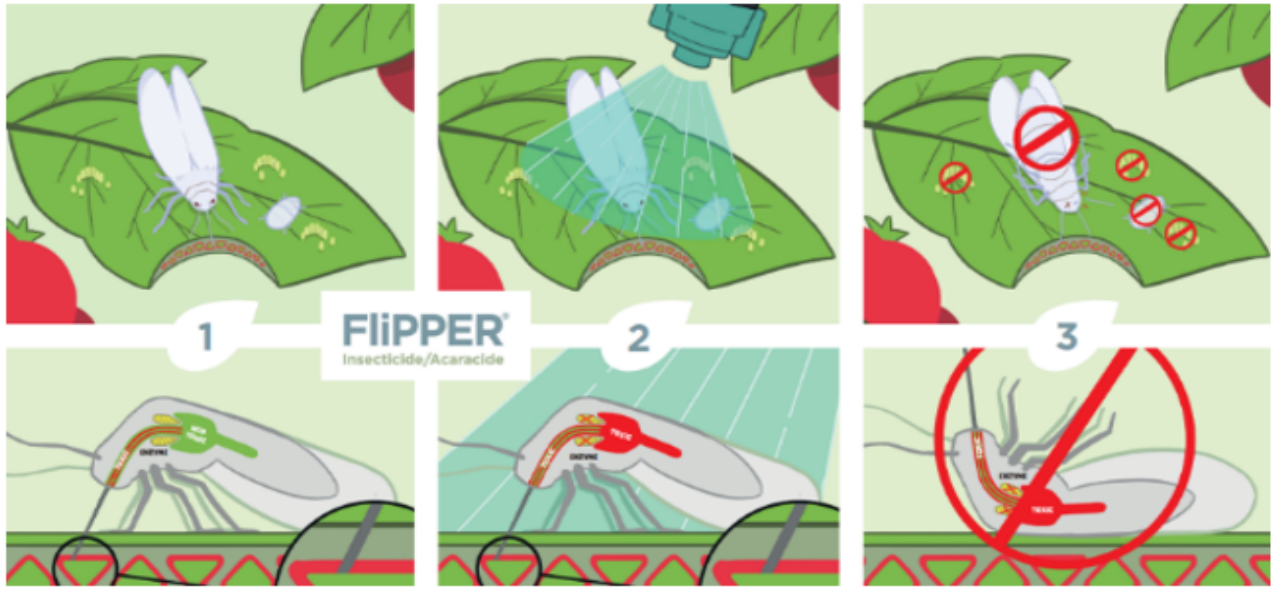
Approved products - bioprotectants

CAUSAL ORGANISM(S)	EXAMPLE CONTROL PRODUCT NAME AND MAPP NUMBER	ACTIVE SUBSTANCE(S) (a.s)	IRAC CODE	COMPATIBILTY WITH BIO CONTROLS	MODE OF ACTION	FIELD / PROTECTED	FIELD RATE (Max. approved rate listed)	PROTECTED RATE (Max. approved rate listed)	ERADICANT / PROTECTANT	APPROVAL STATUS AND EXPIRY DATE*	NUMBER OF APPLICATIONS	MAXIMUM TOTAL DOSE	SPECIFIC RESTRICTIONS	COMMENTS
Aphids (*Aphis gossypii*, *Macrosiphum euphorbiae*, *Myzus persicae* and various other species	Flipper (MAPP19154)	Fatty acids C7-C20 479.8g/L	-	MH	C	F/P	10.0L/ha	16.0L/ha	E	EAMU 3171/19 EAMU 1415/20 - 15/06/27	5 (8)	-	For outdoor and protected crops. Buffer zones based on crop height. Min 400L/ha and max 1,000L/ha water volume and 1.6L/100L concentration. Applications between 1 March and 30 August. Max 8 applications in 3 blocks. For glasshouse: 400-1,600L/ha water volume. Protect bees, close doors and vents	Requires rain or soft water or water conditioner, only use in cooler parts of the year
	Spruzit (MAPP18434)	Pyrethrins 4.59g/L	3	H	C	F/P	6.0L/ha	12.0L/ha	E	On label and EAMU 0911/22 - 15/06/2027	2	-	The max concentration must not exceed 2L of product in 100L of water. This product must not be used on crops taller than 2m in outdoor situations	Do not apply in sunny conditions, risk of scorch

Flipper

- The effectiveness of FLiPPER's active ingredient – Unsaturated Carboxylic Acids (carbon chain lengths C14 – C20) is achieved by the lipophilic carbon chains penetrating the external layers of the target pest.
- These unsaturated part of the carbon chains interacts with multiple vital metabolic processes. This interferes with feeding activity, resulting in mortality.



Carboxylic acids are derived from the production of extra virgin olive oil – thus exempt from EU MRL testing.

Flipper

Best Practice

- Check your **water hardness level** before preparation of the spray solution using appropriate testing strips or conduct a jar test
  - If water hardness is **>300ppm** $CaCO_3$ equivalent or where flocculation or separation occurs, add a **non-acidifying water conditioner**
    - Bayer recommends using **X-Fusion®** from De Sangosse (see Best Use Guidance – Water Quality)
  - If water hardness is **<300ppm** $CaCO_3$ equivalent or where flocculation or separation does not occur proceed with the preparation of the spray solution without the addition of a water conditioner

- Thoroughly **wash and clean the spray tank**, ensuring all residues from previous applications have been removed before preparing the FLiPPER solution
- FLiPPER is physically compatible for use in tank mixture with a wide range of approved insecticides and fungicides.
- **Check the latest Tank mix Sheet** before mixing FLiPPER with any product!
  - **Do NOT tank mix FLiPPER with products containing:**
    - fosetyl-aluminium, myclobutanil, cypermethrin
    - metallic ions different from copper (such as Ca, Zn, Mg, Mn, Fe etc.)

- Use **minimum agitation** during preparation and application to avoid the formation of foam
- **Use the spray solution immediately** following preparation
  - Do not store for future use as this may lead to some separation and consequent dilution of efficacy
- In all cases, conduct preliminary tests on a small area to verify the physical compatibility of the mixture, its crop selectivity and whether expected efficacy performances are reduced
- Storage below 10°C may cause crystallization to occur. This is completely reversible and will not affect the effectiveness of the product

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Flipper

X-Fusion

Solutions of FLiPPER

Water Hardness = 300 ppm $CaCO_3$ equivalent

FLiPPER
(de-ionised water)

pH = 9.62

FLiPPER
(hard water (200ppm $CaCO_3$ equivalent))

pH = 9.81

FLiPPER
(hard water (300ppm $CaCO_3$ equivalent))

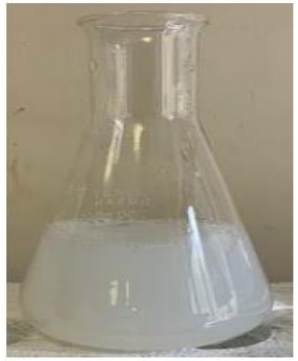
pH = 9.71

FLiPPER
+ X-Change
0.1% v/v

pH = 8.23

FLiPPER
+ X-Change
0.25% v/v

pH = 7.24



FLiPPER
+ X-Fusion
0.1% v/v

pH = 9.69

FLiPPER
+ X-Fusion
0.25% v/v

pH = 9.83

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Flipper

- Good with large aphid species and those exposed to the spray
- Contact only, no persistency
- Avoid using below 15°C and target 18- 22°C
- Do not apply in high temperatures (above 32°C !!!)
- Remains active while the spray film persists on the pest, slower drying is better!
- Correct concentrations (minimum concentration of 1%)
- Coverage is paramount!!!
- Ideally apply early morning when there are NO quick drying conditions (temperature and light increasing or high)
- Do not mix with other *physically acting products

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Spruzit

- Natural pyrethroid
- Contact only, no persistency
- Low concentration + high concentration rapeseed oil
- 2L/100L concentration can be very effective, but risk to crops
- Side effects on many chewing and sucking pests and mites
- Does leave a glossy appearance on the leaves
- Good knockdown, useful in corrective approach
- 600L/ha water volume works best, woolly aphid control too
- Do not mix with other *physically acting products

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Regulatory exempt – SB Plant Invigorator

- Anionic surfactant - sodium lauryl ether sulphate (SLES)
- Useful for easily accessible aphid species
- Can be tank mixed with Mainman to improve melon cotton aphid control
- Best applied in 600-800L/ha water volumes
- Requires regular applications
- Side effects on many sap sucking pests and mites
- Can be phytotoxic especially on fresh growth and yellow or variegated foliage
- It can be costly if more than three applications applied per crop
- Compatible with IPM, but….

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Regulatory exempt – Protac

- Silicone polymers
- Effective with most aphid species, except woolly aphids and roots aphids
- Concentration based product
- Requires dry warm conditions
- Can result in picking up residues from previous applications in spray tanks
- Side effects on many sap sucking pests and mites
- Can be phytotoxic especially on new growth and under hot and sunny conditions
- Do not mix with other products
- Compatible with IPM, but….

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Integrating aphicides within programmes

- Glasshouse, 14-week crop cycle from week 10 (early March)
- Glasshouse aphid, potato aphid, peach potato aphid
- Key considerations include:
  - Monitoring
  - Plant growth
  - Pest pressure
  - Biocontrol establishment

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SUMMARY

- Demise in product availability
- Increase of resistance issues!
- Challenges with HSE and compliance
- Insufficient monitoring
- Proactive approach to aphid control always required
- No ‘one size fits all’ approach
- Need to understand the dynamics between the pest, beneficials, crop cycles and history, production and sales windows and plant knowledge
- Much more reliance on contact product, so coverage becomes very important

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Zest-ICM

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