













FLIPPER[®]

FLIPPER
FAQ

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1 *Prelude*



This document summarises frequently asked questions (FAQs) for FLIPPER®. The information contained herein is a compilation of questions and answers previously received from various countries and regions. Country registered labels may vary in terms of crops, pests and application rates. Please refer to the product label in your country for specific guidance on these topics.



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What is FLiPPER?



FLiPPER® is the result of two decades' research and development. It is an innovative bioinsecticide-acaricide formulation based on an active substance derived from the distillation and fractionation of the by-product of the extra virgin olive oil production process. This commercially confidential process produces the active ingredient which is a specified grouping of unsaturated carboxylic acids. FLiPPER is a fully evaluated Plant Protection Product and registered in many EU countries. FLiPPER provides broad spectrum control by contact against several important pests threatening a wide range of crops. FLiPPER is safe for users, selective for crops, pollinators and beneficial arthropods and is exempt from EU Maximum Residue Limit and USA import tolerance. FLiPPER is permitted for use in organic agriculture and certified at EU level by Ecocert, FiBL and other organic certification bodies.

Summary of FLiPPER

- Provides good, effective control of aphids, whiteflies, thrips and spider mites.
- Trials have also demonstrated control of mealybugs, leafhoppers, psyllids, suckers and scale insects.
- Provides good, effective control of pest populations when applied as per instructions.
- Active against different life stages of pests (juveniles, adults as well as eggs for whitefly, mites and psylla confirmed)
- Has good selectivity for bees, pollinators and beneficial arthropods.

- Fits well with IPM/ICM programmes and biological control programmes.
- Has no cross resistance with other insecticides; controls strains of insects resistant to other chemistries.
- Can be applied with multiple applications during the whole cropping season.
- Meets the requirements of a Low Risk substance definition
- Approved for use in organic crops

What are carboxylic fatty acids?

Carboxylic acids are naturally occurring organic compounds that contain a carboxyl group (carbon, oxygen and hydrogen). They occur widely and can be derived from many different sources. FLiPPER contains a specific group of unsaturated carboxylic acids within the C14 – C20 range, whose selection has been optimised for insecticidal activity.

Production System

The active substance in FLiPPER is produced via multi-stage distillation at a Ministry authorised production facility through physio-chemical processes. Extraction is the result of a patented ISO Quality Controlled process of multistage distillation and fractionation. Formulation and packaging processes are also ISO Quality controlled.

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What is FLiPPER?



Importance of Quality Control

Each batch of FLiPPER® is produced to a tightly defined specification; optimised to contain the right balance/ percentages of unsaturated carboxylic acids that will ensure consistently high levels of efficacy against a wide range of crop pests.

Is FLiPPER's Active Ingredient of Unsaturated Carboxylic Acids different from that contained in Fatty Acids, Soaps and Oil formulations?

Yes, FLiPPER's active ingredient is different. It's source material and sophisticated method of transformation determine that it will contain a specific grouping of unsaturated carboxylic acids within the C14 – C20 range whose selection is optimised for insecticidal activity. The purity and percentage content level of unsaturated carboxylic acids in FLiPPER is higher than in other formulations within the same class of chemistry. The source material for FLiPPER's active ingredient is olive acid oil from the extra virgin olive oil production process. The oil extraction is achieved by a physical process not utilising solvents. The refinement of the active ingredient is achieved utilising a sophisticated process that produces a technical active ingredient with a purity level of higher than 97.5 % of which over 88 % will be unsaturated carboxylic acids. The processes are designed to ensure close control in the replication of highly specified batches.

A wide variety of extracts from animal rendering, vegetable oil and hydrocarbon oil production are used in agriculture. These include amino acids, peptides and fatty acids from the animal rendering processes; paraffinic or mineral oils from hydrocarbon refinement processes; vegetable oils, essential oils and fatty acids from vegetable sources.

The chemistry of the finished product is dependent on the origin of its starting material. The quality, purity and behaviour of the finished product is determined by the method and quality of its transformation and processing. These various factors determine that products from different sources may have completely different characteristics and performance. Whilst they might all be described as coming from "natural sources" this can sometimes be misleading.

Generic 'soaps' are basic potassium salt of fatty acids formulations which typically contain non-specific groupings of variable chemical composition.

Oils used as foliar sprays in agriculture can be of plant or mineral origin and usually require the inclusion of an emulsifier to ensure miscibility with water. Oils can be phytotoxic in some circumstances and can be very damaging to beneficial insect populations.

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Mode of action questions



Does FLiPPER® provide effective control?

FLiPPER demonstrates consistently high levels of efficacy against a broad spectrum of important pests across a wide range of crops where application has achieved good contact with the target.

What is FLiPPER's Mode of Action?

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 and gaining access to the cell membrane. Once inside the cell, the unsaturated part of the carbon chains enables binding with a number of vital cell components and further effects membrane fluidity. This disrupts the cell functionality, interferes with feeding activity in phytophagous insects and results in mortality. FLiPPER can also block insect trachea disrupting insect respiration.

Will FLiPPER control insect and mite eggs?

Activity against pest eggs may be observed as the slowing down or prevention of development into subsequent life forms. FLiPPER appears to interfere with cell metabolism preventing egg hatch. Egg hatching reduction following the application of FLiPPER at label rates has been observed in several trials on whiteflies, *Tuta absoluta*, stink bugs, mites and pear suckers.

Why is FLiPPER safe on beneficial insects when most insecticides are not?

FLiPPER carries an IOBC rating of 1 or 2 for beneficial insects. The low toxicity to beneficial insects and pollinators is not fully understood and is currently being further investigated. After application of FLiPPER, once the spray-film has dried, beneficial organisms and pollinators can be introduced without any risk to the population. When an established population of beneficial organisms is already present at the time of application, FLiPPER applied at standard rates does not cause an unacceptable reduction to beneficial arthropod populations. In this case, many beneficials evade spray treatment thanks to their behaviour and mobility but those exposed to FLiPPER also survive in large numbers.

Does the ai for FLiPPER have an IRAC classification?

FLiPPER is currently classified by IRAC as UNE (Botanical essence including synthetic, extracts and unrefined oils with unknown or uncertain MOA.)

Can FLiPPER help with resistance management?

There is no reported resistance or reduced sensitivity against FLiPPER. In addition, there is no cross-resistance with any other existing insecticide chemistry group. When used in Integrated Pest Management programmes, FLiPPER can be a suitable tool for resistance management of target pests.

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Mode of action questions



Is FLiPPER® a Systemic or Translaminar product?

FLiPPER has no systemic or translaminar activity. The product's efficacy relies on establishing direct contact with the target pest. Thus, care needs to be taken that application of the spray solution is targeted at the pest, and the water volume chosen is suitable to achieve a good coverage of the crop.

How quickly will FLiPPER control target pests?

The full effects of a spray application are most evident after 48 hours. Where the pest has received a sub-optimal dose mortality may take longer and a subsequent, second application is advised. Check efficacy at 2 and seven days after application. Lab assays on aphids measuring honey dew excretion indicate that feeding already stops ~30 mins after a FLiPPER treatment.

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Preparing a spray solution with FLiPPER



IMPORTANT: Before preparing a spray solution with FLiPPER®, thoroughly **wash and clean the spray tank**, ensuring all residues from previous applications have been removed.

What is the optimal pH range for FLiPPER, and does it need buffering?

FLiPPER is stable in aqueous solution (EW type of formulation) across a wide range of water pH values without any adverse impact on product efficacy. The pH level of FLiPPER is alkaline and when in solution the pH will increase and may reach pH values of 10+. This is expected and declared within all the relevant registration dossiers. The addition of acidifiers to lower the water pH is not recommended as it could potentially reduce product solubility, efficacy and plant safety.

Can FLiPPER be applied using hard water?

Where Total Dissolved Solids (notably magnesium and calcium) are present in excess of 300 ppm (30° fH or 16.8° dH), water hardness may lead to a milky appearance and the occurrence of flocculation which could reduce efficacy. If your water hardness exceeds 300 ppm or visible flocculation or separation occurs we recommend the use of a non-acidifying water conditioner such as, X-Fusion® which has been specifically developed by De Sangosse for use with FLiPPER. Other options are Align® from IntraCrop or the use of a chelating agent such as Tri-sodium salt of citric acid (TSCA). Ensure all spray solution / water is thoroughly softened prior to addition of FLiPPER by running the sprayer agitation and recirculation for a few minutes prior to the addition of FLiPPER.

Should I use an adjuvant, sticker or spreader with FLiPPER?

The use of additives is not recommended with FLiPPER except in cases where the necessary inclusion of hard water requires the use of water conditioners. (See previous)

Does FLiPPER foam during mixing?

FLiPPER mixes readily with water and does not require vigorous agitation. It is recommended to keep the agitation to a minimum and slowly add FLiPPER to the spray tank half filled with clean water, keeping also the water load at minimum speed. In case of tank mixes with other products FLiPPER must be added last to the spray solution. High levels of agitation can result in some foaming. Anti-foam agents can be added if the problem persists.

How long can FLiPPER spray solution sit in the spray tank?

It is recommended that only the quantity of spray solution required for an application to the target crop area should be prepared and that this should be applied promptly following preparation. FLiPPER spray solution should not be left for any prolonged period without ongoing gentle agitation in the tank and should certainly not be left overnight.

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Use, dose and application



When should I apply FLiPPER®

Apply FLiPPER at the first sign of pest infestation build up and then repeat applications at 7-day intervals according to the development of the pest.

How often should I apply FLiPPER?

Apply FLiPPER as and when the target pest is building up but not more frequently than every 7 days and then not more than 3 consecutive sprays followed by a gap of 28 days. If using FLiPPER in tank mix with other products, observe the longest spray interval of the tank mix partner(s). Review the local registration and label for country specific indications for interval and number of applications per crop and pest.

How long will FLiPPER be effective after application?

FLiPPER is a contact insecticide with no residual activity after the spray deposit has dried. Pest control may be seen for several days after application and this is due to the initial spray contact with the pest.

What weather conditions do I need to consider in order to achieve good coverage of the pest?

Apply when there is no likelihood of rain and ensure the spray film has dried before the use of overhead irrigation to avoid wash-off. Avoid outdoor applications when wind conditions may impair thorough coverage.

What is the rain-fastness of FLiPPER?

FLiPPER is a product active by contact with the pest, so rain-fastness is not strictly relevant to the product's performance.

Does humidity affect the application or efficacy of FLiPPER?

The effect of humidity on efficacy is largely unproven and will differ from pest to pest. Humidity has a greater impact on the behaviour of target pests as some pests such as thrips are more mobile in high humidity conditions. Other pests such as spider mites are the complete opposite - seeking drier warmer parts of the plant. Understanding the target pest's behaviour is key to optimal application. Timing and spray technology should be chosen accordingly to establish good contact between the specific pest and the spray solution.

Do I need to apply FLiPPER in the evening to get the best results?

FLiPPER can be applied at any time of the day, paying attention to label instructions, best management practices and making preliminary tests in the case crops are stressed or conditions are not standard. Application in the evening, during the night or early morning may be beneficial, if insects are more exposed and the sprayed vegetation may remain wet for longer.

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Use, dose and application



Can I use FLiPPER® when the crop is flowering?

In some countries FLiPPER's registration permits its use during the flowering period, however good agricultural practise dictates it is not recommended to make applications whilst bees are actively foraging. Local regulations may apply, so always check the label.

We do not recommend application in open flowers of ornamental species as many are particularly susceptible to damage from any sprayed solution at the open flower stage.

Do I need to exclude bees/bumblebees from the crop before spraying with FLiPPER?

In protected crops, hives should be closed during spraying but can be safely re-opened once the FLiPPER spray solution has dried. It is advisable to check with your supplier of biological control agents for detailed recommendations about the introduction of beneficial organisms.

Can I mix FLiPPER with other biological products such as azadirachtin, *Bacillus subtilis* and *Bacillus thuringiensis*?

FLiPPER is physically compatible for use in tank mixture with a wide range of approved insecticides and fungicides. However, caution on compatibility needs to be taken when choosing the right *Bacillus thuringiensis* tank mix partner, as well as with sulphur and copper formulations. In addition, do not tank mix FLiPPER with products containing, fosetyl-aluminium, myclobutanil,

cypermethrin or metallic ions different from copper (such as Ca, Zn, Mg, Mn, Fe etc.). Please refer to the FLiPPER tank mix sheet available on our website (crops.science.bayer.co.uk) for the most up to date list of compatible tank mix partners.

Is FLiPPER compatible with the use of beneficial nematodes?

We have no experience with the use of FLiPPER with beneficial nematodes but anticipate that they would not be compatible if they were applied in tank mix as a foliar spray.

Can FLiPPER be used in organic farming?

The fatty acids in FLiPPER are included in the list of active substances authorised for use in organic farming pursuant to current regulations at EU level (Reg. (EC) 34/2007 and Annex II Reg. (EC) 889/2008). FLiPPER can be used to meet organic production standards as set forth in EU, USA and other geographies. In the UK, FLiPPER is verified by The Soil Association and certified for use in organic systems by OF&G and SOPA. FLiPPER can also be used as part of a low-to-zero-residue management crop production strategy.

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Rates of application and water volumes



What dose rate of FLiPPER® should I use?

The recommended spray concentration is 1 L of FLiPPER (formulated product) in 100 L of water (1 % v/v solution). This means: 10 L of product /ha with a spray solution volume of 1000 L/ha. Maximum rates per application depend on crop, pest and specific registration in each country. Always check the local label and registration for more detail. Under normal circumstances better results will be obtained applying 2 applications with 1 % v/v concentration at 7-day interval rather than one application at 2 % v/v concentration.

What water volume should I use with FLiPPER?

FLiPPER should be applied with enough water to achieve good coverage of the target foliage and placement on the pest. Applying to run off can be wasteful and should be avoided. If higher water volumes are required to achieve a good coverage, ensure the maximum dose rate of FLiPPER per ha is not exceeded by diluting the spray mix accordingly.

Is there a maximum number of FLiPPER applications per season?

The maximum number of applications per season varies from 5 to there being no limit depending on the crop and the specific registration in each country. We would recommend FLiPPER is used in programmed blocks of not more than 3 applications at 7-day intervals followed by a gap of 28 days. However, always check the local label and registration for more detail.

How do I calculate Leaf Wall Area (LWA) dose rate?

Normally this is calculated with tabled formulae indicated by country level regulatory authorities. The FLiPPER labelled rates for vertical crops are indicated in L/ha or L/10.000 m² LWA, if required according to country level certificate of registration.

Will FLiPPER leave deposits on the plant?

Some slight milky deposit might occur if FLiPPER is applied using hard water.

How can I be sure of getting coverage on the underside of the plant leaf?

This depends very much on the crop structure, nozzle type, nozzle angle, water volume and application pressure as well as sprayer type. These factors will all impact on coverage. FLiPPER should be applied with enough pressure / air assistance to slightly move the leaves, so that the formulation is deposited on the target foliage area. Very high water pressure or a very high air flow will increase drift, will be detrimental to achieving optimal coverage and will mean that the spray does not settle on the target foliage. For row / wall production systems, application should be made to both sides of the row / wall rather than alternate rows / walls. Angling nozzles at 45° allows spray to get between and past front leaves. Water sensitive paper placed at various heights on the crop canopy can give a good indication of coverage. Through testing of various settings will allow the growers to optimise their own application system.

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Rates of application and water volumes



Can I apply FLiPPER® with a ULV sprayer on a protected crop?

Optimal coverage of the crop and pest is essential for contact insecticides. The FLiPPER inclusion rate of 1 % has been developed to deliver consistently high efficacy using standard water volumes. Reducing the water volume and therefore the amount of product applied may affect performance and therefore is not recommended.



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Compatibility



Is FLiPPER® compatible with other agricultural products?

FLiPPER is physically compatible for use in tank mixture with a wide range of approved insecticides and fungicides. However, do not tank mix FLiPPER with acid products, foliar fertilizers, as well as products containing, fosetyl-aluminium, myclobutanil, cypermethrin or metallic ions different from copper (such as Ca, Zn, Mg, Mn, Fe etc.). Please refer to the FLiPPER tank mix sheet available on our website (cropscience.bayer.co.uk) for the most up to date list of compatible tank mix partners. In case of tank mixes with other products, FLiPPER must always be the product added last to the tank.

Can I tank mix FLiPPER with a systemic insecticide / fungicide?

FLiPPER is compatible with several systemic insecticides and fungicides. Please refer to the FLiPPER tank mix sheet available on our website (cropscience.bayer.co.uk) for the most up to date list of compatible tank mix partners.

Can I use FLiPPER in conjunction with all beneficial insects?

FLiPPER is compatible with IPM systems and could be combined with other pest control tools like biological control. When Flipper is applied on some sensitive species of beneficial arthropods a slight and transient effect could be observed (< 50 %) nevertheless, due to the no residual activity of FLiPPER the population recovers quickly. For more precise information, please refer to the selectivity list provided by AlphaBio/Bayer. To ensure minimal risk to beneficial arthropods FLiPPER should be applied following the label recommendations. To maximise the benefits for both, first spray with FLiPPER then introduce beneficial insects 24 hours later.

How can I find out if FLiPPER is compatible with my range of beneficial insects?

FLiPPER has been tested on a wide range of naturally occurring and introduced beneficial insects. A full list is available from AlphaBio Control / Bayer Crop Science. If you are introducing a new beneficial or one not included on the available lists, introduce the beneficial insects 24 hours after the application of FLiPPER.

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Crop safety and phytotoxicity



Will an application of excess FLiPPER® damage the crop?

If the concentration of FLiPPER in a spray solution is too high and does not follow the standard recommendations, then there is a risk of crop damage. The standard use rate for FLiPPER is 1 % and at this rate it has shown a very high level of crop safety in trials and in commercial usage under a wide range of conditions.

In addition, run-off of excess spray solution should be avoided. Run-off may lead to accumulation of droplets in specific spots on leaf tips or fruits, resulting in up-concentration of product in these spots, which might harm the waxy layer, e.g. in case of grapes or other fruits.

Does FLiPPER de-wax the plant leaf or fruit?

FLiPPER may de-wax leaves or fruit especially where repeated applications are made or in case of runoff.

This is particularly important in ornamental crops such as carnations where the leaf finish may be important or in table grapes where a waxy bloom may enhance the presentation of the fruit.

Has any phytotoxicity been seen when using FLiPPER?

At 1 % the crop safety record is excellent. Some slight leaf scorch has been recorded in glasshouse peppers in the Netherlands under certain growing conditions, but this is not exceptional for the pepper variety tested and has also been observed with other insecticides. Additionally, some symptoms of damage to the waxy bloom in table grape berries have been observed in trials in Italy. For cucumber

it is recommended to limit the number of applications to 2 per block. Care must always be taken with ornamental crops. We would recommend first treating a small area and assessing after 3 and 7 days due to high number of cultivars per crop.

Can FLiPPER be used in crops growing during winter under glasshouses or plastic tunnels?

Where FLiPPER has approval for use in these crops yes, it can be safely used during the winter period.

Could tank mixes with FLiPPER cause crop damage?

Tank mixes are made at user's risk and care should always be exercised. AlphaBio Control have tested only for physical compatibility and not for crop safety. However, there have been no reports to date of adverse effects from the commercial use of tank mixes.

How soon after applying FLiPPER can I apply a herbicide or fungicide?

This will depend on the crop, the stage of growth and on the herbicide or fungicide being applied. If a selective herbicide is applied, follow good agricultural practice and wait until the crop has redeveloped a waxy leaf; this would normally be 7 – 10 days. In the case of a fungicide this might be tank mixed, if it is physically compatible, or in the case of sulphur, copper products or incompatible fungicides we recommend waiting for at least 3 days.

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Product safety



What is the toxicity of FLiPPER®?

FLiPPER has a low toxicity to humans and non-target arthropods. FLiPPER's active ingredient has been listed as a Low Risk Substance (as it meets requirements of Art. 47 EU Reg. 1107/2009). Dossiers have been submitted to support the listing of the formulated product as Low Risk. FLiPPER does not have acute toxicity effects to non-target organisms and is rapidly biodegraded. Use of FLiPPER is very unlikely to lead to concentration thresholds that are of concern.

If I spray FLiPPER near water, will it affect aquatic life?

FLiPPER's active substance has a low acute toxicity on aquatic non-target organisms, and is readily biodegradable in water, therefore chronic effects are unlikely to happen. The Environmental hazard classification of FLiPPER is aquatic chronic hazards category 3, which carries H412 hazard phrase. The release of the FLiPPER concentrate into water bodies must be avoided and the disposal of containers must be realised under current local regulations to avoid risk. When using the spray solution in standard conditions, it is good practice to use anti-drift nozzles, especially with tall crops (> 2 m). Spraying tree crops like pome fruit, stone fruit, citrus or olive will require anti-drift nozzles and/or, in some countries, buffer zones of 5 – 20 m. Please check the local registered label.

What is the re-entry interval (REI) for FLiPPER?

The re-entry following the application of FLiPPER is recommended only after the sprayed vegetation is dried. Always check the local registered label for country specific requirements.

What is the pre-harvest interval (PHI) for FLiPPER?

The pre-harvest interval varies from country to country from zero days to three days with most EU countries at 1 day. Please check the local country registered label. These pre-harvest intervals relate only to standard national requirements, because FLiPPER is exempted from MRL so no PHI is deemed necessary.

What is the Maximum Residue Level (MRL) for FLiPPER?

FLiPPER has been evaluated by EU regulatory authorities, whose conclusion was that the active substance of FLiPPER is of food grade quality and is therefore exempt from EU MRL testing requirements.

Is FLiPPER volatile and does it have a strong smell?

No; FLiPPER has a low volatility and virtually no unpleasant smell.

What is the half-life of FLiPPER?

The half-life of FLiPPER varies according to the medium. The half-life in soil is 0.2-3 days depending on soil type. Regarding stability in water, it is generally recommended to freshly prepare the spray solution directly before application.

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Product storage and shelf life



Do I have to store FLiPPER® in a chemical store?

FLiPPER is a registered plant protection product and therefore storage must comply with local country regulations on the storage, safe handling and use of pesticides. Please refer to the FLiPPER SDS for each country.

At what temperature should FLiPPER be stored?

FLiPPER should be stored under typical crop protection storage conditions; in a cool, dry location. It is best to avoid prolonged exposure to high heat or extreme cold conditions.

Will freezing or very cold conditions negatively affect FLiPPER?

No. Storage below 10° C may cause some crystallization to occur, but this is completely reversible and will not affect the performance of FLiPPER.

What is the expected shelf life of FLiPPER?

Shelf life requirements vary by country, please check for local country specific guidance. FLiPPER has been tested and shown to be stable for at least 2 years.





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For more information, call 0808 1969522 for technical advice or visit:
croscience.bayer.co.uk/flipper

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