BASIS 2023

A project exploring the efficacy of five plant protection products with physical modes of action, for the control of Tetranychus spp. spider mites in cherries grown under temporary protection.

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EXECUTIVE SUMMARY

The aim of this project was to find a suitable chemical/s which can be used in future integrated pest management (IPM) programmes to help suppress and eradicate spider mites which are affecting cherry crops grown under temporary protection. The two species of spider mites known to affect cherry crops are *Tetranychus spp*. i.e., Two Spotted Spider mite *and Panonychus ulmi,* European Fruit Tree Red Spider Mite (EFTRSM).

This research was carried out at Lower Hope Fruit (LHF) in Herefordshire, home to 34 hectares of cherry orchards, all of which are grown under temporary protection. Growers there have seen spider mites cause detrimental damage to both crops and fruit throughout 2022 and 2023 seasons. The current IPM strategy which is discussed in this project is not adequately controlling the pest. Insecticides which are known to work such as *Kanemite®SC* and *Batavia* cannot be relied on as their 'outdoor only' authorisation prevents them from being used during the season, when poly tunnels are covered, and pest pressure is present.

Five chemicals which each work with a physical mode of action (MOA), *FLiPPER, Majestik®, ProTac® SF, SB Plant Invigorator and Secover* are all permitted for use on temporarily protected cherries. These products were sprayed on to cherry trees with severe *Tetranychus spp.* infestations and the efficacy of each treatment was scored and discussed.

INTRODUCTION

Spider mites in cherries & identification

There are two species of spider mite which can commonly be found within cherry plantations, *Tetranychus urticae,* (Two spotted spider mite, TSSM) and *Panonychus* ulmi (European fruit tree red spider mite, EFTRSM), (Fountain, M 2018). When populations of spider mites are inadequately managed and are given favourable conditions, they can reproduce rapidly. *S*pider mites suck sap from the underside of leaves, which then turn yellow as they lose chlorophyll. Continual feeding

and pest damage without control can eventually lead to crop death, (Koppert, 2023a). Early signs of spider mite presence are visible from the top of the leaf as demonstrated in figure 1.

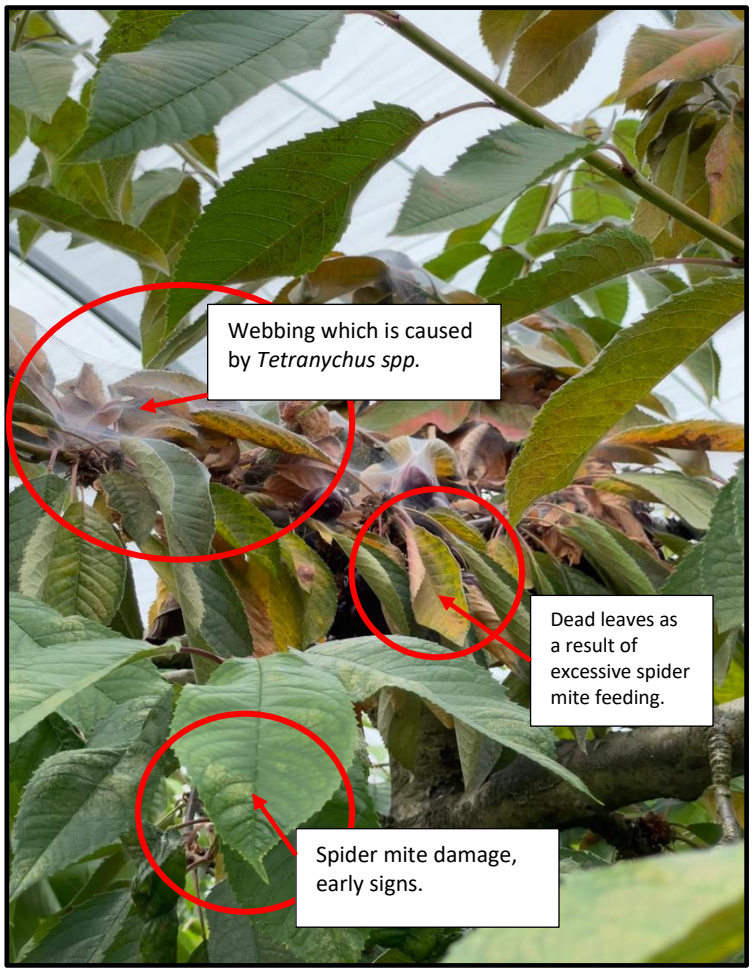


Figure 1- Spider mite damage to cherry tree at Lower Hope Fruit, 2023. (Smith. E (Author), 2023a)

During the spring and summer months when actively feeding, adult TSSM, are yellow to green in colour with two distinguishable dark spots on their back. Reproduction occurs between temperatures of 12°C and 40°C, the life cycle from egg to adult form can take as little as five days to complete in the highest of temperatures. Mites can be found anywhere on the tree, but they generally populate and cause the most damage at the top where it is hot and dry. Webbing is also produced by TSSM, webs are intended as protection and enable mites to spread out into new areas of the crop, referred to as 'ballooning'. Webbing can also damage fruit, affecting the marketable yield, see figure *2.* Moving into winter, TSSM feeding reduces and mites turn red in colour, referred to as diapause. fully diapaused mites no longer feed or lay eggs and it is not possible to control

them with Plant Protection Products (PPPs) during this life stage., Adult males measure 0.6mm (AHDB, 2023). Figure *3* details the life cycle of the TSSM.

Figure 2 – Tetranychus spp. webbing smothering cherry fruits at Lower Hope, 2023. (Smith. E (Author). 2023b

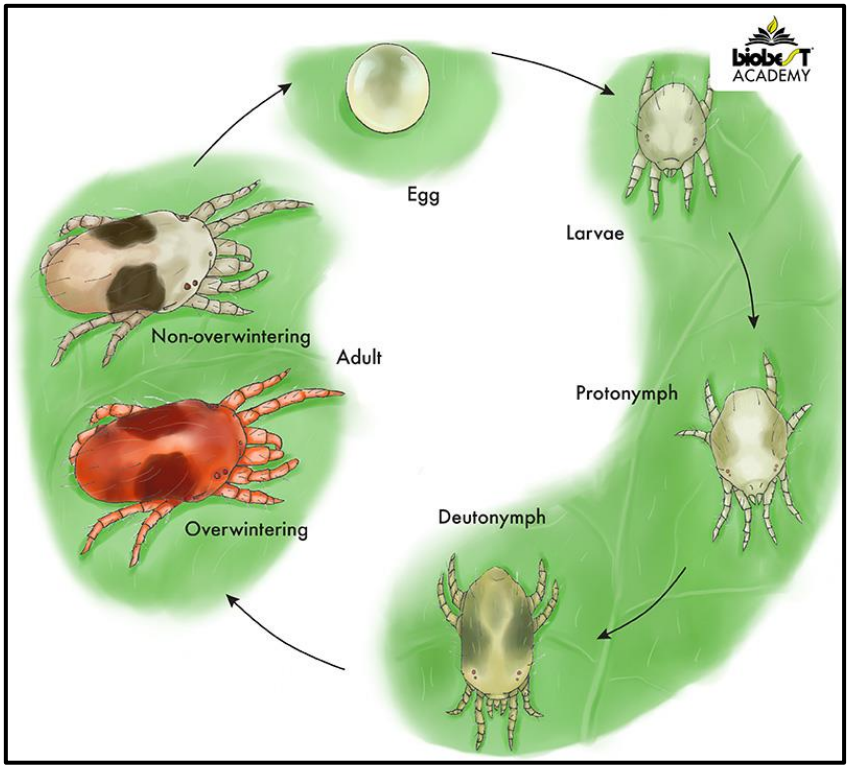


Figure 3 - Tetranychus urticae life cycle (Biobest Group NV. 2023)

EFTRSM do not create webbing in the same way as TSSM, they produce a fine silk line, barely visible to the eye. Adult males at 0.4mm are slightly smaller than TSSM. They have a dark red, oval shaped body with distinctive white spots visible at the base of the hairs on their back. These mites also over winter but in egg form only, they do not diapause, (Fountain, M 2018).

Figure 4 - Panonychus ulmi - (Plantwose Knowledge Bank, 2023)

Varying levels of spider mite damage can be found throughout the orchards at Lower Hope Fruit, there is one area, 'Field S' which has been severely affected by the pest during the 2022 and 2023 growing seasons. Visible symptoms include widespread webbing, leading to the assumption that TSSM is present. Upon closer inspection of 'Field S', the appearance of the mites whilst active (figure 5) matches the description of *Tetranychus cinnabarinus,* (AHDB, 2023), commonly referred to as *Carmine red spider mite.* This observation inspired further research into spider mite species; Auger, P., et al (2014) collated research findings, TSSM and Carmine Red Spider mites can interbreed and produce viable offspring, they also state *Tetranychus spp*. cannot be determined by their colour alone, the two genera of mite are a synonym. Specialist identification of the pest would give precise indication of the mites present within the orchards, but this is not seen as necessary for their control, knowing the species is *Tetranychus* is sufficient knowledge.

Figure 5 - Photo of spider mites affecting crops at Lower Hope Fruit, Field S 2023. (Smith., E 2023c)., Assumed to be Tetranychus spp.

Controlling spider mites in protected cherries

The first stage of any pest control strategy should be cultural and sanitary measures which help reduce the likelihood of a pest outbreak, i.e., removing pruned wood from an orchard which has been severely affected by spider mites, although this example is not always a realistic task on a large-scale commercial operation.

Biological controls such as *Phytoselius persimillis* and *Amblyseius andersoni,* can be purchased and deployed at a desired rate to predate spider mites, (Koppert, 2023a). *A. andersoni* are delivered in small sachets which can be hung on to trees, Simon Beesely, Technical Agronomist at Bioline Agrosciences advises a minimum of one or two sachets per tree/metre. Hotspot treatment with *Phytoselius* could also be helpful where *Tetranychus spp.* is the pest, although not effective for the control of EFTRM.

Natural enemies should also be encouraged into orchards, *Feltiella acarisuga*, *Stethorus punctillum, Typhlodromus pyri* all predate spider mites (AHDB, 2021). Creating habitat for predators close to the crop is the key to encouraging them. NIAB scientists are currently collaborating on an EU

project entitled ‘Beespoke’, wildflower strips between rows in orchards themselves have proved to have a positive impact on populations of naturally occurring beneficial insects (Fountain. M, 2022).

Chemical controls for spider mites on protected cherries are limited, *Kanemite® SC* (*aceqinocyl*) and *Batavia (spirotetromat),* are both effective but can only be sprayed on cherries which are outdoors, (HSE, 2023c) & (HSE, 2023d). Biological fungicides such as *Naturalis-L* (*beauveria bassiana ATCC-74040)* can only be sprayed where crops are under permanent protection, (HSE, 2023e) although *Botanigard WP* (*b. bassiana GHA),* can be used at the grower’s risk with an extension of authorisation for minor use (EAMU), (HSE., 2023f). There are also some products available which have a physical mode of action (MOA), although excellent spray coverage is key to their efficacy.

Current spider mite control strategies at Lower Hope Fruit

Kanemite® SC is applied as a post-harvest clean up treatment after poly tunnel covers are removed, this alone is not sufficient spider mite control, earlier intervention is necessary. It is difficult to use *Batavia* at the start of the season as the ideal time for application is after flowering, (Bayer,2023a), by which time most of the cherries have been covered with poly tunnel plastic, intended to protect blossoms from frost damage.

Biological control introductions have not been overlooked although they are not used within the current IPM strategy, LHF growers lack confidence that predators would be able to survive with the use of chemical insecticides which are difficult to avoid. An obvious decline in natural predators has been observed over time, former Grower Manager, Andy Hunt commented that the orchards were once renowned for healthy populations of beneficials, he also trialled *A. andersoni* introductions following the decline of natural predators some years ago, seeing little in the way of their establishment. (Hunt. A, 2023).

There is a corelation between reduction of predator presence and the use of *Tracer (spinosad)* which has been applied in recent years for the control of *Drosophila suzukii* (SWD). As per label guidance, *Tracer* is not compatible with biological control programmes, (Corteva, 2023). SWD is notoriously difficult to manage in cherries, growers have been dependent on chemical interventions to ensure they have a marketable yield. Sterile insect techniques are in development,

aimed at the control of SWD without reliance on chemicals, i.e., *BigSis* which is currently being trialled at LHF, (BigSis, 2023). Successful roll out of this programme and reduction of insecticide use would certainly aid the survival of predators within the cherry orchards.

Some calculations were carried out to estimate the potential cost of deploying *A. andersoni sachets* across all cherry orchards at LHF, see Table 1. The cost of product alone is £1036.71 per hectare for an application of one sachet per metre. The chemical alternatives are outlined in Table 2, the most expensive product is £165 per hectare, per application to apply. Pest control strategies should be responsible and environmentally sensitive, ideally a combination of all available options, but ultimately the overall cost is a huge influence on a grower's choice products. Running a profitable business is important, balancing financial decisions with the choice of pest control is all part of Integrated Farm Management approach. (IFM) (Lainsbury, M.A, ed, 2023).

Table 2 displays some chemicals which are available for use on cherries under temporary protection, they each work by physical MOA, unlike *Batavia* and *Kanemite®* there is little to no chance of pests becoming resistant to any of these products.

Table 1 - Projected costing for biological control deployment in cherry orchards, 2023 season, 34 hectares. (Average cost of deployment per metre has been forecasted using actual data from biological deployment in raspberry crops at Lower Hope).

		Linear M Cherry Beds	Average cost of deployment per metre	Estimated number of hours labour	Deployment cost for 1 round in cherries. £10.43 per hour	Holiday Pay	Bottles / sachets required for round	Cost of Product	**Total cost of round**	**Cost per Hectare**
Phytoselius persimilis	25 Mites/ metre	141489.9	£0.009	122.09	£1,273.41	£152.61	354	£10,611.74	**£12,037.77**	**£352.81**
Amblyseius andersoni	Sachets 1 per metre	141489.9	£0.016	217.05	£2,263.84	£271.31	141489.9	£35,372.48	**£37,907.63**	**£1,111.01**
	Sachets 1 every 2.5m	141489.9	£0.016	217.05	£2,263.84	£271.31	56595.96	£14,148.99	**£16,684.14**	**£488.98**

Table 2 - Comparison of Plant Protection Products available for Spider Mite control in Cherries:

ACTIVE INGRIDIENT BRAND NAME MAPP NUMBER	HARVEST INTERVAL	TARGET	APPROVAL	APPLICATION RATE/ MAX INDIVIDUAL DOSE	MAXIMUM NUMBER OF APPLICATIONS	APPLICATION METHOD, TIMING, CROP STAGE	EFFECT ON BIOLOGICALS	PRICE PER HECTARE
Mixture of silicon polymers **ProTAC ®SF** N/A	None	Spider mite, works mainly against mobile stages of the pest.	N/A	12% / 0.6L/500L water	None specified	First sign of pest Minimum 7 days between applications If needed, buffer water to pH range 4.0 – 7.5	Not Specified	£62.48
maltodextrin **Majestic®** 17240	1 Day	Spider mite adults and newly emerged nymphs No species specified	All outdoor and protected crops.	25ml per litre of water 500L = 12.5L/Ha	20	2 applications 4-7 days apart. Repeat applications permitted on label but no interval has been specified	Harmful	£146.43
Sodium Lauryl Ether Sulphate **SB Plant Invigorator** N/A	None	A wide range of pests including spider mites. No species specified	N/A although label states product has been extensively tested on Prunus spp including Cherry	Professional formulation. 100ml concentrate to 100 litres water 500L = 0.5L/Ha	N/A	For heavy infestations spray at 2-3 day intervals, then following this weekly or fortnightly applications can commence Label states heavy infestations of spider will need 2-3 repetitive applications	Not harmful	£64.09
Fatty Acids C7-C20 **FLiPPER** 19154	None	Two spotted spider mite Tetranychus urticae specified active on eggs, larvae and adult insects	EAMU 3419 of 2019. Outdoor and protected cherry.	10L / ha in water volume 400-1000 L/ha 500L = 10L	8 Per Crop	Minimum 7 days between repeat applications. 28 days minimum interval between each block of 3 applications 1st March - 30th August for crops outdoors or under protection. Water conditioning may be needed	No Data	£165.83
Silicon based product **Secover** N/A	None	Spider mite Life stage and species not specified.	N/A Although label states it can be applied to stone fruits	recommended concentration: 0.2% 500L = 1L	None specified	Use when first colonies appear. Product will remain effective for 14 days. Repeat after 14 days if necessary Do not use during periods of bee activity Use only in cloudy weather and in the morning. Do not apply subsequent fungicides until 3 days after Secover application	Not harmful	£80.00
Chart created using product labels/ EAMU which are included in appendix 7-13 *(Certis Europe B.V), (Bayer Crop Science Ltd), (ICB Pharma Sp.J), (Certis), (Fargro Ltd), (Synthos Agro)* *Prices are confidential and are subject to change at any time, they are intended as a guide*								

LEGISLATION, HEALTH, AND SAFETY AND THE ENVIRONEMNT

Pesticide definition

A pesticide or plant protection product (PPP) is defined as: any substance, preparation or organism prepared or used, among other uses, to protect plants or wood or other plant products from harmful organisms; to regulate the growth of plants; to give protection against harmful creatures; or to render such creatures harmless. (HSE, 2023a).

Pesticide Laws

Pesticide usage is strictly governed and regulated by laws both in the European Union and the United Kingdom. *The Food and Environmental Protection Act 1985 (FEPA) Part III* was the foundation for creating laws aimed at controlling pesticide usage. This act is at the very top of the legal hierarchy of pesticide laws. There are four main aims of FEPA; to protect the health of human beings, creatures, and plants, safeguard the environment, ensure humane and safe control of pests and to make pesticide information is available to the public (Legislation.gov, 2023)

The aims of FEPA were achieved with implementation of the following regulations:

- ***Control of pesticide regulations (1986), (COPR)*** which defined the types of pesticides subject to control and those which are not, prescribes the approvals required for sale, use, supply and storage of any pesticide product. Allows general conditions for sale, supply, storage, advertising, and use of pesticides, this includes aerial application (HSE, 2023a). Integrated Pesticide Management was introduced for the first time under this regulation, an environmental approach to pest and weed management. See IPM triangle in Figure 6, chemical control is at the top of the model as a last resort to managing a pest or weed problem.

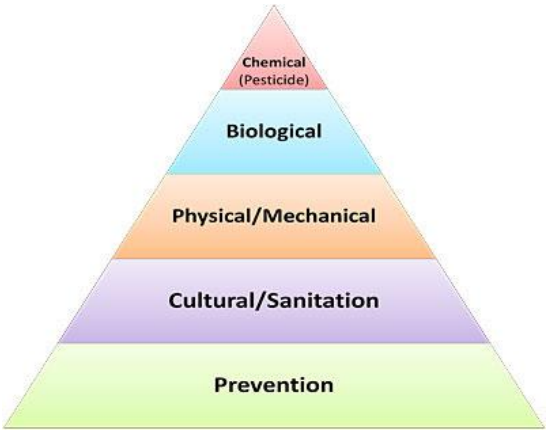


Figure 6 - IPM triangle, (Teagsac, 2017)

- ***Plant Protection Products Regulations, 1997****,* the main aim of this was to encourage growers to adopt 'best practice' for pesticide usage. Pesticide rules changed from a risk-based criteria to hazard based, chemicals which were hazardous were banned and greater measures to protect water ways, public spaces and conservation areas were brought in.

- ***Regulation 1107/2009*** re-wrote the pesticide approval/re-newel process of COPR (1986), switching from a risk-based criteria to hazard based, now a two-stage process, making it harder than ever before to prove the safety of Plant Protection Products (PPPs). At stage one the active ingredient is approved, the final marketable product is approved and a MAPP, (ministry approved pesticide) number is assigned at the second stage. *The Chemical Regulations Division (CRD)* database which is accessible to all online contains the official list of chemical approvals.

Codes of practice for pesticide use and supply

The "grey" *Code of Practice for Using Pesticide Products (Defra, 2006).,* which covers all the legislation and outlines rules for safe pesticide usage, including storage and record keeping. The "yellow" *Code of Practice for suppliers of pesticides to agriculture, horticulture, and forestry, (DEFRA, 1998),* is for suppliers of PPP. Both documents shall remain in place until re-written under *The Sustainable Use of PPPs 2012.*

Pesticide Approvals

- Fully approved with a MAPP number – product has been through the two-stage process as explained above – Field of use, rates and target pests are stated on the product label.
- Extension of authorisation for minor use (EAMU) for off label use - an EAMU grants approval for use of a product on fields which are not stated on the product label. Rates and conditions of use may differ from the product label, use of a product with an EAMU is entirely at the grower's risk.
- Emergency approval – Valid for up to 120 days from date of issue, usually in response to an alien pest invasion.

There are products which can be used as PPPs which do not have any of the above approvals, *Secover, SB Plant Invigorator* and *ProTAC® SF* are examples. These are products which work by physical means only, i.e., suffocation of the pest and they do not contain a chemical which is required to gain approval under UK law. Product labels must still be followed to avoid phytotoxicity to crops.

MRLs

- ***The pesticide Maximum Residue Levels (MRL) Regulations of 1994***. An MRL is assigned to an active ingredient during the first stage of the approval process, it is important that pesticide residues within produce do not exceed the MRL, which is a measure of good agricultural practice. Failure to comply with product label guidance, including harvest intervals when using PPPs is how an MRL would be exceeded. i.e., *Kanemite SC®* only has one permitted round for outdoor cherries as stated on the label, any subsequent sprays within a year are not approved and would be detectable via MRL testing.

Protecting the environment

Further updates to pesticide legislation include, ***The Sustainable Use of Pesticides (Plant Protection Products) Regulations 2012***, which transpose the Sustainable Use Directive (SUD), 2009/128/EC, set by the European council (HSE,2023b), these regulations brought the UK in line with the rest of

the EU, some parts of COPR and FEPA were re-written putting more focus on 'best practice' than ever before including promotion of integrated pesticide/ crop management techniques, threshold based pest monitoring and, reduction of reliance on PPPs which in turn help to protect the environment and water courses.

The Water Framework Directive (WFD) set by the European Union sets EU wide standards for water courses where pesticides residues can be detected, it is important all measures are taken to reduce pesticide leaching into water ways. Aquatic buffer zones provide a barrier between a crop and a water course, the size of the buffer is determined though *Local Environmental Risk Assessments for Pesticides (LERAPs),* which are specific to products and must be followed as per the label. Updated Interim schemes and Drift reduction technology (DRT) allow for some buffer zones to be reduced in certain cropping situations. Similarly Arthropod Buffer Zones are intended to protect non target insects and wildlife on uncropped land.

Health & Safety and COSHH

The Control of Substances Hazardous to Health (COSHH) Regulations 2022 sit beneath the ***Health and Safety at Work Act 1974*** which applies to all industries and activities of work. The aim of COSHH Regulations is to eliminate, where possible the use of hazardous substances, replacing them with a less harmful alternative. It is a legal requirement for all PPPs to be risk assessed under the COSHH guidance before they can be utilised, aimed at protecting humans and the environment too. Each chemical must be assessed individually, and a document produced, legally this information must be always available and accessible to employees and all users of the PPP. The 'AESTOP' technique should be used when risk assessing chemicals, *Table 3* outlines this technique in relation to the chemicals discussed and tested for the purposes of this research. *Kanemite® SC* is the most hazardous chemical with three hazard pictograms and a workplace exposure limit (WEL), *SB Invigorator* however is the least hazardous of the six. Each chemical used in this trial was individually COSHH assessed prior to use, these documents can be viewed in appendix 1-6.

Table 3 – 'AESTOP' Technique for COSHH assessing chemicals.

COSHH Risk Assessment Process	Kanemite® SC	FLiPPER	Majestik®	SB Plant Invigorator	Secover	ProTAC® SF
Assess hazards (Look at hazard pictograms, on product label. Also check MSDS for further information of potential hazards and risks to health/ environment).	 - Can cause allergic skin reaction. - May cause damage to blood circulation by prolonged or repeated exposure. - Harmful/ toxic if swallowed. - Causes serious eye damage. - Crop should not be handled until 4 days after treatment. After this crop can be handled with gloves only until 12 days have passed. - There is a WEL for this product.	 - May cause skin and eye irritation - May cause respiratory irritation - Harmful to aquatic life with long lasting effects	 - Causes serious eye irritation	 - May cause skin and eye irritation	 - Harmful if inhaled - Causes serious eye irritation - Harmful to aquatic life with long lasting effects	 - Harmful if inhaled - Causes serious eye irritation - Harmful to aquatic life with long lasting effects
Eliminate the risk	- Sanitary controls i.e., removal of infected wood after pruning - Create suitable habitat for biological controls/ naturally occurring predators to suppress the pest without/ with less chemical intervention - Regular crop scouting, treatment of hotspots before pest spreads out of control					
Substitute with a less hazardous product	FLiPPER, Majestik®, SB Plant Invigorator, Secover & ProTAC® SF -safer products which can be used earlier in the season to control pest without having to resort to Kanemite® SC.					
Technical or engineering controls	I.e., closed cab on sprayer tractor fitted with carbon filtration. Sufficient ventilation in chemical shed and mixing area.					
Operational - qualifications/ certification	- PA1 & 3 For application by air assisted sprayer in orchards, or PA1/PA6 for Knapsack applications - National register of sprayer operators (NRoSO) member. - Signage to inform members of the public of spraying operations.					
Personal Protective Equipment (PPE)	E.g., Nitrile Gloves EN388, Rubber boots EN13832/ EN ISO 20345, Visor/ Goggles EN166, Chemical coverall - Type 6, Respirator with appropriate filter, i.e., AEBK P. Guidance for the appropriate PPE will be on MSDS and should be always worn when operator is in contact with the chemical, it is employers' responsibility to provide PPE, free of charge.					

REPORT

Aims

- Test and compare the efficacy of the five products listed in table two
- Find a substitute product for *Kanemite® SC* which can be used earlier in the growing season to suppress spider mites before they cause significant damage to the plants and yield.

Predictions

It is hypothesised that the two products which have a MAPP number shall have a more effective control of spider mites than the other products in this trial.

Method

Products with a MAPP number, *Majestik®* and *FLiPPER* were applied following mandatory label/ EAMU instructions. *ProTAC® SF*, *SB Plant Invigorator* and *Secover* however are not regulated in the same way and do not have a MAPP number, not containing any chemistry which is required to gain approval through the CRD for an active ingredient. The labels for these latter three products do not legally have to be obeyed, although exceeding the manufacturers recommended dose could cause phytotoxicity to the plants, thus label guidance was also followed for the application of these PPPs. Table 4 shows when each product was applied. *Secover* had the least applications, only applied twice as label guidance recommends leaving 14 days between applications.

The level of spider mite infestation was consistent throughout the trail area, each chemical was allocated 3 trees, there were 5 pots and a total of 15 trees were included in the trial. Each product was mixed in 2L of water and applied with a knapsack sprayer, *Table 4* details PPP spray applications for the trial and Table 5 shows the amount of chemical mixed per application.

Table 4 – PPP Applications (spray records)

Product	Date	Start Time	End Time	Outside Temp	Outside Wind (Beaufort RMets, 2023)	Wind Direction	Outdoor Weather Conditions	Crop Situation	Indoor Climate
Flipper	21/07/2023	10:00	10:15	15°C	4	NW	Cloudy, dry	Poly tunnel	Dry
Majestik®		10:25	10:40						
ProTAC® SF		10:50	11:00						
SB Plant Invigorator		11:10	11:25						
Secover		11:30	11:45						
Majestik®	25/07/2023	09:00	09:15	12.5°C	3	N	Sunny, dry	Poly tunnel	Dry
SB Plant Invigorator		09:25	09:35						
Flipper	31/07/2023	10:00	10:10	21°C	3	E	Light rain	Poly tunnel	Humid
Majestik®		10:20	10:30						
ProTAC® SF		10:50	11:00						
SB Plant Invigorator		11:10	11:25						
SB Plant Invigorator	03/08/2023	08:35	08:40	18°C	2	N	Heavy rain	Poly tunnel	Humid
Secover		09:00	09:10						
Flipper	07/08/2023	08:00	08:10	13°C	6	S	Cloudy, dry	Poly tunnel	Dry
Majestik®		08:20	08:30						
ProTAC® SF		08:35	08:45						

Table 5 – Quantity of chemical used per application

Product	Quantity of chemical used per application
Flipper	40ml/ 2l
Majestic®	50ml/ 2l
ProTAC® SF	2.4ml / 2l
SB Plant Invigorator	2ml/ 2l
Secover	4ml/ 2l

Results

Twenty-four hours after treatment ten leaves were selected at random from each of the plots, an electronic magnifying lens was used to look at the leaves and assess the efficacy of the spray coverage. A score between 1-5 was then assigned to each leaf based on how well the treatment had worked, the key which was used to score is outlined in Table 6. After each set of ten leaves were scored, they were then totalled out of 50. This scoring system was a method of quantifying efficacy.

The complete data set of scores can be viewed in appendix 14 *Table 7* is an example of how the data was collected for each sample

Table 6 – Scoring Key

SCORE KEY	
SCORE	**DESCRIPTION**
1	No Mortality
2	Very low mortality, overall poor spray coverage
3	Coverage is better but still some surviving
4	Brilliant coverage, one or two still living but overall, excellent mortality
5	Perfect 100% mortality of mites (although there could still be unhatched eggs)

Table 7 – Example of leaf scoring

Majestik®-21/07/2023	
LEAF NUMBER	SCORE
1	4
2	2
3	3
4	3
5	4
6	3
7	3
8	2
9	2
10	2
TOTAL	**26**

All results have been collated and presented in two graphs, both containing the same data, interpreted slightly differently.

Figure 6 shows the efficacy score of each product with the dates each treatment was applied.

Figure 7 presents the efficacy scores and the number of times each product was applied.

Figure 6 – Summary of efficacy scores after each treatment

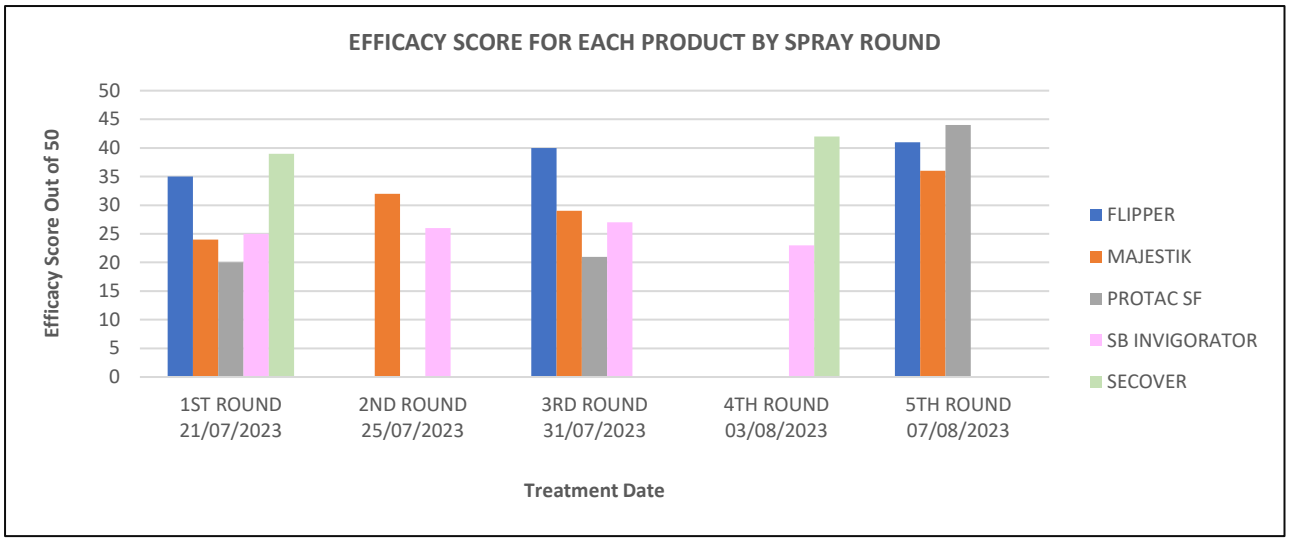
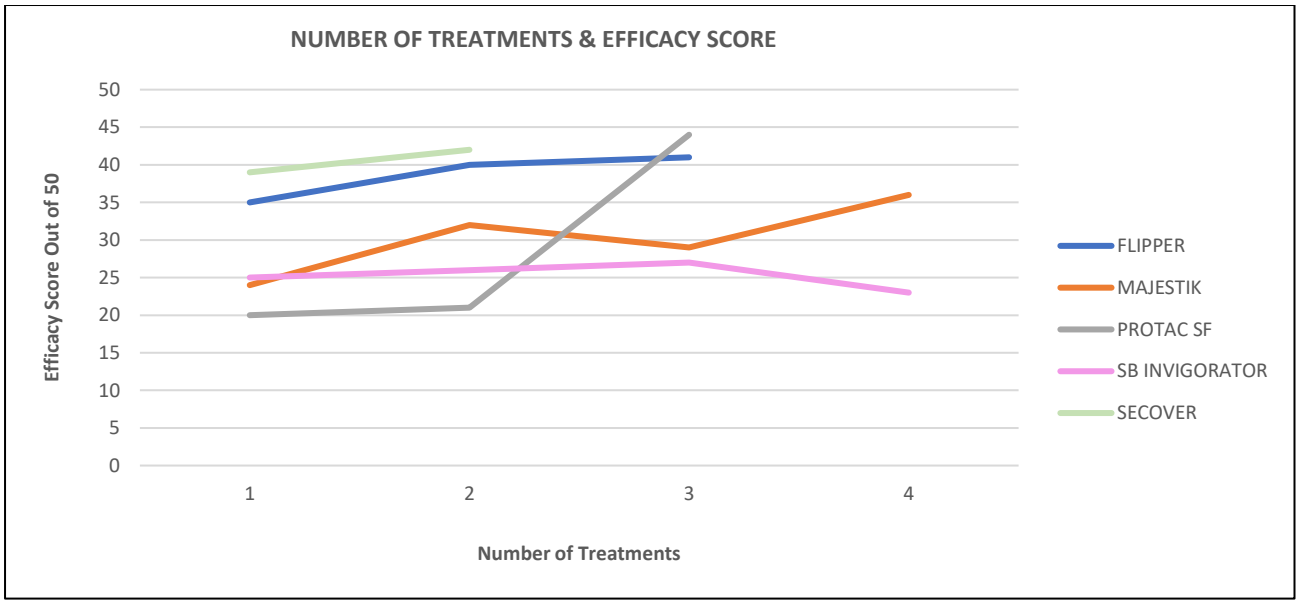


Figure 7 – Efficacy score vs number of treatments



DISCUSSION

The results from this project have not met with the prediction that the two products with a MAPP number, *FLiPPER* and *Majestik*® would be more effective than the other three without MAPP numbers. The most effective treatment by far was *Secover* which was sprayed less than all other products. *Secover* is a safer product to use under the COSHH regulations and the label states 'not harmful' to biological controls, thus this was a welcomed result. Out of the five products tested, the most favourable to use on a field scale are *Secover* and *FLiPPER.*

FLiPPER scored the next highest to *Secover* in the trial, before opting to use this product though it's lack compatibility with beneficials should be considered. A benefit of *FLiPPER* is its ability to eradicate all life stages of *Tetranychus* spp., including eggs. Under the guidance of the EAMU 3419, *FLiPPER* can be used three times with a 7-day interval, although once three applications have been made a 28-day interval must be observed before further treatments can be applied.

Secover doesn't state on the label which life stages or species of spider mite it is effective on, 7 days after the first treatment of *Secover*, an extra leaf assessment from the plot was carried to assess the effectiveness between applications (see appendix 15)**.** The score dropped from 39 to 25, the sample assessed had high numbers of juvenile spider mites, suggesting that this spray of did not eradicate eggs. This knowledge is beneficial, *Secover* would be a good product to use where spider mite infestation is minimal, whereas *FLiPPER* might be preferred where pest pressure is much higher. The *FLiPPER* label states that the formulation is effective specifically on TSSM, there is no suggestion that it has any efficacy against *EFTRSM.*

It would be beneficial to gain knowledge on how the products trialled work against *EFTRSM*, whilst this species was not the target in this piece of research, it is a common pest of fruit trees and future presence in orchards, alongside *Tetranychus spp*. is certainly a possibility. It can be assumed that *Secover*, *ProTAC® SF*, *Majestik* and *SB Plant Invigorator* could work against *EFTRSM* as their labels state simply 'spider mites' as a target, with no reference to specific species. This an area which would be beneficial to investigate in the future.

The results from *SB Plant Invigorator* were disappointing, the average efficacy score was 26 out of 50 and a total of 4 treatments were applied. This product is considered the 'safest' to use under COSHH regulations and is not harmful to beneficials, should results have been more desirable, this would have been a great product to consider using in future IPM programmes. There are no specific restrictions on the label in relation to tank mixing *SB Plant Invigorator* with other products either i.e., regular fungicide treatments. The ability to mix products and spray them at the same time is a huge benefit to the grower as there is less strain on resources to complete additional spray rounds. Unfortunately, *FLiPPER®* and *Secover* cannot be mixed with other chemicals and the *Secover* label specifically states that it should be sprayed three days before a fungicide.

It should be noted that label guidance for all the products trialled state treatments should be made at the first signs of pest presence. Each of the 15 trees sprayed were severely infected by *Tetranychus* mites, pest pressure was far beyond early stages. Perhaps results could have differed if pest presence was lower to start with. It would be beneficial to test some or all the products again, especially *SB Plant Invigorator* to gain understanding on how it works where pressure is lower in the first instance.

The *ProTAC®* SF results are the most intriguing, the first two sprays scored 20 and 21 out of 50, and the final treatment leapt up to 44 out of 50 which is the highest score recorded in this trial. It is unclear why there is such a difference and unreliability of this result forces certain questions to be asked, such as why did this happen? The weather conditions recorded for the first application are very similar to the last so it is unlikely that the climate and drying time are the reason, although this should not be ruled out. It would be beneficial to test this product some more before a conclusion of its efficacy can reliably be made.

The final product to discuss is *Majestik®*, the efficacy of this product was mid-range with scores from the 4 treatments ranging from lowest 26 to highest 36 out of 50. In terms of rank this sits below *FLiPPER*, whilst it is good to know how well *Majestik®* works, the chances of using it knowing there are better options available is low. The cost of *Majestik®* works out at £146.43 per hectare treated, *FLiPPER* in comparison is £165.83, higher efficacy was observed from *FLiPPER* with fewer applications which makes this a much more cost-effective treatment. *Secover* is even less at £80.00 per hectare treated, thus, from a financial perspective *Majestik®* is not a good product to use.

The cost of a treatment should never drive a grower's choice of PPP, it is best practice to choose the most environmentally conscious and safest of all the options available. There is however no escaping the current economic climate which is forcing growers to make decisions based on the budgets and resources which they have available, it is not likely that the cost difference between *Secover* and *FLiPPER* would break many budgets. The cost of deploying biological controls however at over £1000 per hectare for the product alone, is a completely different league to the chemical alternatives. The use of predatory mites for any pest control is far superior to chemical application and would be the most environmentally conscious approach, providing they can establish and control the target pest sufficiently. The grower needs 100% confidence in a biological control programme before making the investment, this confidence does not currently exist at LHF as the use of chemicals in the current IPM programme are incompatible with biologicals. This includes actives such as *spinosad* which practically is very difficult to avoid using when trying to produce a high quality and marketable yield, which is ultimately the overall aim.

CONCLUSION

There were two aims of this project which have both been successfully achieved, test and compare the efficacy of the five products which are approved for use on cherries grown under temporary protection. Also, to find a substitute product for *Kanemite® SC* which can be used earlier in the growing season, suppressing spider mites before they cause significant damage to the plants and yield within cherry plantations at Lower Hope Fruit.

Both aims were achieved, a set of data was produced and analysed, *Secover* and *FLiPPER* were the most successful products in this trial with good efficacy observed. It should be noted that neither of these products completely eradicated the target pest, whilst they may not be able to substitute the use of *Kanemite® SC,* they can be used earlier in the season to suppress pest numbers before they cause detrimental harm to trees and fruit. *Kanemite® SC* is also known to work on EFTRSM whereas no data was collected on the efficacy of *Secover* and *FLiPPER* against EFTRSM.

There are positives and negatives surrounding the use of both *Secover* and *FLiPPER*, i.e., FLiPPER is not compatible with biological controls, but it will kill all stages of TSM, including eggs, unlike *Secover* which is not harmful to biological but only takes out mobile stages. All these factors should be risk assessed with a BASIS registered agronomist before a deciding the best course of action.

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APPENDICES

Appendix 1

COSHH Risk Assessment -

Product Name: Flipper – MAPP 19154

Company name: Lower Hope Fruit Ltd	Dept: Fruit
Describe the activity or work process. *(Inc. how long/ how often this is carried out and quantity substance used)*	- **Product**: Insecticide/ plant protection product. For professional use only. - **Form**: Liquid, emulsion in water. - **Activity**: Substance is to be mixed with water into knapsack sprayer tank, then applied to crops with a hand lance.
Location of process being carried out?	Mixing to take place in designated area at Sidnall Farm by trained/ qualified operator. Spraying to take place in designated trial area on 'Field S' at Sidnall Farm.

Identify the persons at risk:	Employees	x	Sub-contractors		Public	
Name the substance involved in the process and its manufacturer. *(A copy of a current safety data sheet is attached to this assessment)*	Product - Fatty acids, C8-18 and C18-unsatd., potassium salts Manufacturer – Bayer				

Classification *(state the category of danger)*

	☐ Toxic		☐ Oxidising		☐ Gas Under Pressure
	☒ Harmful/ Irritant		☐ Flammable		☐ Carcinogen
	☐ Corrosive		☐ Explosives		☐ Dangerous for the environment

Hazard Type

Gas	Vapour	Mist	Fume	Dust	Liquid	Solid	Other (State)
☐	☒	☐	☐	☐	☒	☐	☐ _____

Route of Exposure

Inhalation	Skin	Eyes	Ingestion	Other (State)
☒	☒	☒	☒	☐ _____

Workplace Exposure Limits (WELs) *please indicate n/a where not applicable*

N/A

State the Risks to Health from Identified Hazards

- Causes skin and eye irritation
- May cause respiratoty irritation
- Harmful to aquatic life with long lasting effects

Control Measures:

Ensure all safety precautions are read and understood before handing substance
Do not eat, drink or smoke around substance
Always have access to spillage kit

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Flipper	1	01/09/2023	Emma Smith		

Always wash hands after use.
Report any spills/ water course contamination to the Environment Agency,

Is health surveillance or monitoring required? Yes [X] No [ ]

Personal Protective Equipment *(state type and standard)*

 Dust mask	[ ]		 Visor	[X]	Suitable for chemical splashes
 Respirator	[X]	Respirator with AEBK1 Filters	 Goggles	[ ]	Tight sealing goggles EN166 or equivalent
 Gloves	[X]	Chemical resistant nitril gloves. Minimum 'EN 388' Rating.	 Overalls	[X]	Chemical coverall. Minimum 'Type 6' – Chemical splash resistent
 Footwear	[X]	Chemical & slip resistent rubber boots with steel safety toe protection. – EN13832 or equivalent	 Other	[ ]	

First Aid Measures

- **General measures** - If you feel unwell or experience any of the following, seek imidiate medical advice/ assistance, show chemical label/ data sheet
- **After Inhilation** – Allow affected person to breathe fresh air. Allow affected person to rest
- **After skin contact** – Remove affected clothing and wash all exposed skin with mild soap and water, followed by warm water rinse.
- **Eye Contact** – Rinse immidiatetly with warm water for 15 minutes. Remove/ dispose of any contact lenses.
- **Injestion** – Do not induce vomitting

Storage

- Store in well ventilated & bunded chemical store away from all drinks and foodstuffs
- Ensure store is locked when not supervised by authorised personel
- Ensure solids are stored above liquids
- Store only in original container and keep cintainer closed when not in use

Fire

In event of fire, toxic fumes will be released.

- Suitable extinguishing media: Water spray. Dry powder. Foam. Carbon dioxide.
- DO NOT USE HEAVY WATER STREAM

Disposal of Substances & Contaminated Containers

- Dispose of unused substance and containers only with authorised hazardous waste contractor.
- Tripple rinsed containers can be disposed with general waste.
- Collect spills with spill kit and dispose with hazadous waste contractor.

Is exposure adequately controlled? Yes [X] No [ ]

Risk Rating Following Control Measures

High [ ] Medium [ ] Low [X]

Doc No:	Issue No:	Issue Date:	Created by:	Authorised by:	Page 2 of 2
Flipper	1	01/09/2023	Emma Smith		

Appendix 2

COSHH Risk Assessment -

Product Name: Majestik – MAPP 17240

Company name: Lower Hope Fruit Ltd	Dept: Fruit
Describe the activity or work process. *(Inc. how long/ how often this is carried out and quantity substance used)*	- Product: Plant protection product to be used as an insecticide. - - Form: Liquid – Suspension concentrate - - Activity: Substance is to be mixed with water into knapsack sprayer tank, then applied to crops with a hand lance.
Location of process being carried out?	Mixing to take place in designated area at Sidnall Farm by trained/ qualified operator. Spraying to take place in designated trial area on 'Field S' at Sidnall Farm.

Identify the persons at risk:	Employees [x]	Sub-contractors [ ]	Public [ ]	
Name the substance involved in the process and its manufacturer. *(A copy of a current safety data sheet is attached to this assessment)*	Product – Maltodextrin & Amides C8-18 Manufacturer – ICB Pharma			

Classification *(state the category of danger)*

[ ]	Toxic	[ ]	Oxidising	[ ]	Gas Under Pressure
[X]	Harmful/ Irritant	[ ]	Flammable	[ ]	Carcinogen
[ ]	Corrosive	[ ]	Explosives	[ ]	Dangerous for the environment

Hazard Type

Gas	Vapour	Mist	Fume	Dust	Liquid	Solid	Other (State)
[x]	[X]	[x]	[X]	[ ]	[X]	[ ]	[ ]

Route of Exposure

Inhalation	Skin	Eyes	Ingestion	Other (State)
[X]	[X]	[X]	[X]	[ ]

Workplace Exposure Limits (WELs) *please indicate n/a where not applicable*

N/A

State the Risks to Health from Identified Hazards

- Repeated exposure may cause skin irritation
- Can cause eye irritation

Control Measures:

Ensure all safety precautions are read and understood before handing substance
Do not eat, drink or smoke around substance
Always have access to spillage kit

Doc No:	Issue No:	Issue Date:	Created by:	Authorised by:	Page 1 of 2
Majestik	1	01/09/2023	Emma Smith		

Always wash hands after use.
Report any spills/ water course contamination to the Environment Agency,

Is health surveillance or monitoring required? Yes [X] No [ ]

Personal Protective Equipment *(state type and standard)*

Dust mask	[ ]		Visor [X]	Suitable for chemical splashes
Respirator	[ ]	Respirator with AEBKP filters - to prevent inhalation	Goggles [ ]	Tight sealing goggles EN166 or equivalent
Gloves	[X]	Chemical resistant nitril gloves. Minimum 'EN 388' Rating.	Overalls [X]	Chemical coverall. Minimum 'Type 6' – Chemical splash resistent
Footwear	[X]	Chemical & slip resistent rubber boots with steel safety toe protection. – EN13832 or equivalent	Other [ ]	

First Aid Measures

- **General measures** - If you feel unwell or experience any of the following, seek imidiate medical advice/ assistance, show chemical label/ data sheet
- **After Inhilation** – Allow affected person to breathe fresh air. Allow affected person to rest
- **After skin contact** – Remove affected clothing and wash all exposed skin with mild soap and water, followed by warm water rinse.
- **Eye Contact** – Rinse immidiatetly with warm water for 15 minutes. Remove/ dispose of any contact lenses.
- **Injestion** – Do not induce vomitting

Storage

- Store in well ventilated & bunded chemical store away from all drinks and foodstuffs
- Ensure store is locked when not supervised by authorised personel
- Ensure solids are stored above liquids
- Store only in original container and keep cintainer closed when not in use

Fire

In event of fire, toxic fumes will be released.

- Suitable extinguishing media: Water spray. Dry powder. Foam. Carbon dioxide.
- DO NOT USE HEAVY WATER STREAM

Disposal of Substances & Contaminated Containers

- Dispose of unused substance and containers only with authorised hazardous waste contractor.
- Tripple rinsed containers can be disposed with general waste.
- Collect spills with spill kit and dispose with hazadous waste contractor.

Is exposure adequately controlled?	Yes [X]	No [ ]

Risk Rating Following Control Measures

High [ ] Medium [ ] Low [X]

Appendix 3

COSHH Risk Assessment -

Product Name: ProTAC® SF – MAPP N/A

Company name: Lower Hope Fruit Ltd	Dept: Fruit

Describe the activity or work process. *(Inc. how long/ how often this is carried out and quantity substance used)*	- **Product**: Plant protection product to be used as an insecticide. - - **Form**: Liquid, to be diluted in water - **Activity**: Substance is to be mixed with water into knapsack sprayer tank, then applied to crops with a hand lance.
Location of process being carried out?	Mixing to take place in designated area at Sidnall Farm by trained/ qualified operator. Spraying to take place in designated trial area on 'Field S' at Sidnall Farm.

Identify the persons at risk:	Employees	x	Sub-contractors		Public	
Name the substance involved in the process and its manufacturer. *(A copy of a current safety data sheet is attached to this assessment)*	Product – Polyalkyleneoxide modified heptamethyltrisiloxane Manufacturer – ICB Pharma				

Classification *(state the category of danger)*

	Toxic		Oxidising		Gas Under Pressure
X	Harmful/ Irritant		Flammable		Carcinogen
	Corrosive		Explosives	X	Dangerous for the environment

Hazard Type

Gas	Vapour	Mist	Fume	Dust	Liquid	Solid	Other (State)
x	X	x	X		X		

Route of Exposure

Inhalation	Skin	Eyes	Ingestion	Other (State)
X	X	X	X	

Workplace Exposure Limits (WELs) *please indicate n/a where not applicable*

N/A	Wear personal protective equipment at all times when handling/ mixing this substance. Handle in well ventilated area.

State the Risks to Health from Identified Hazards

- Harmful if inhaled
- Causes serious eye irritation
- Harmful to aquatic life with long lasting effects

Control Measures:

Ensure all safety precautions are read and understood before handing substance
Do not eat, drink or smoke around substance

Doc No:	Issue No:	Issue Date:	Created by:	Authorised by:	
ProTAC®SF	1	01/09/2023	Emma Smith		Page 1 of 2

Always have access to spillage kit
Always wash hands after use.
Report any spills/ water course contamination to the Environment Agency,

Is health surveillance or monitoring required? Yes [X] No [ ]

Personal Protective Equipment *(state type and standard)*

Dust mask	[ ]		Visor [X]	Suitable for chemical splashes
Respirator	[ ]	Respirator with AEBKP filters - to prevent inhalation	Goggles [ ]	Tight sealing goggles EN166 or equivalent
Gloves	[X]	Chemical resistant nitril gloves. Minimum 'EN 388' Rating.	Overalls [X]	Chemical coverall. Minimum 'Type 6' – Chemical splash resistent
Footwear	[X]	Chemical & slip resistent rubber boots with steel safety toe protection. – EN13832 or equivalent	Other [ ]	

First Aid Measures

- **General measures** - If you feel unwell or experience any of the following, seek imidiate medical advice/ assistance, show chemical label/ data sheet
- **After Inhilation** – Allow affected person to breathe fresh air. Allow affected person to rest
- **After skin contact** – Remove affected clothing and wash all exposed skin with mild soap and water, followed by warm water rinse.
- **Eye Contact** – Rinse immidiatetly with warm water for 15 minutes. Remove/ dispose of any contact lenses.
- **Injestion** – Do not induce vomitting

Storage

- Store in well ventilated & bunded chemical store away from all drinks and foodstuffs
- Ensure store is locked when not supervised by authorised personel
- Ensure solids are stored above liquids
- Store only in original container and keep cintainer closed when not in use

Fire

In event of fire, toxic fumes will be released.

- Suitable extinguishing media: Water spray. Dry powder. Foam. Carbon dioxide.
- DO NOT USE HEAVY WATER STREAM

Disposal of Substances & Contaminated Containers

- Dispose of unused substance and containers only with authorised hazardous waste contractor.
- Tripple rinsed containers can be disposed with general waste.
- Collect spills with spill kit and dispose with hazadous waste contractor.

Is exposure adequately controlled?	Yes [X] No [ ]

Risk Rating Following Control Measures

High [ ] Medium [ ] Low [X]

Appendix 4

COSHH Risk Assessment -

Product Name: SB Plant Invigorator – MAPP N/A

Company name: Lower Hope Fruit Ltd	Dept: Fruit
Describe the activity or work process. *(Inc. how long/ how often this is carried out and quantity substance used)*	- **Product**: Plant protection product/ insecticide - **Form**: Liquid, to be diluted in water - **Activity**: Substance is to be mixed with water into knapsack sprayer tank, then applied to crops with a hand lance.
Location of process being carried out?	Mixing to take place in designated area at Sidnall Farm by trained/ qualified operator. Spraying to take place in designated trial area on 'Field S' at Sidnall Farm.

Identify the persons at risk:	Employees [x]	Sub-contractors [ ]	Public [ ]

Name the substance involved in the process and its manufacturer. *(A copy of a current safety data sheet is attached to this assessment)*	Product – Sodium Lauryl Ether Sulphate Manufacturer – Fargro

Classification *(state the category of danger)*

[ ] Toxic		[ ] Oxidising		[ ] Gas Under Pressure	
[X] Harmful/ Irritant		[ ] Flammable		[ ] Carcinogen	
[ ] Corrosive		[ ] Explosives		[ ] Dangerous for the environment	

Hazard Type

Gas	Vapour	Mist	Fume	Dust	Liquid	Solid	Other (State)
[ ]	[X]	[x]	[X]	[ ]	[X]	[ ]	[ ]

Route of Exposure

Inhalation	Skin	Eyes	Ingestion	Other (State)
[X]	[X]	[X]	[X]	[ ]

Workplace Exposure Limits (WELs) *please indicate n/a where not applicable*

N/A

State the Risks to Health from Identified Hazards

- Causes skin irritation
- Causes serious eye irritation

Control Measures:

Ensure all safety precautions are read and understood before handing substance
Do not eat, drink or smoke around substance
Always have access to spillage kit
Always wash hands after use.

Doc No:	Issue No:	Issue Date:	Created by:	Authorised by:	Page 1 of 2
SB Plant Invigorator	1	01/09/2023	Emma Smith		

Report any spills/ water course contamination to the Environment Agency,			
Is health surveillance or monitoring required? Yes [X] No [ ]			
Personal Protective Equipment *(state type and standard)*			
 Dust mask [ ]		 Visor [X]	Suitable for chemical splashes
 Respirator [ ]	Respirator with AEBKP filters - to prevent inhalation	 Goggles [ ]	Tight sealing goggles EN166 or equivalent
 Gloves [X]	Chemical resistant nitril gloves. Minimum 'EN 388' Rating.	 Overalls [X]	Chemical coverall. Minimum 'Type 6' – Chemical splash resistent (Not listed on product MSDS, but worth wearing to protect personal clothing)
 Footwear [X]	Chemical & slip resistent rubber boots (Not listed on product MSDS, but worth wearing to protect personal clothing)	 Other [ ]	
First Aid Measures			
- **General measures** - If you feel unwell or experience any of the following, seek imidiate medical advice/ assistance, show chemical label/ data sheet - **After Inhilation** – Allow affected person to breathe fresh air. Allow affected person to rest - **After skin contact** – Remove affected clothing and wash all exposed skin with mild soap and water, followed by warm water rinse. - **Eye Contact** – Rinse immidiatetly with warm water for 15 minutes. Remove/ dispose of any contact lenses. - **Injestion** – Do not induce vomitting			
Storage			
- Store in well ventilated & bunded chemical store away from all drinks and foodstuffs - Ensure store is locked when not supervised by authorised personel - Ensure solids are stored above liquids - Store only in original container and keep cintainer closed when not in use			
Fire			
In event of fire, toxic fumes will be released. - Suitable extinguishing media: Water spray. Dry powder. Foam. Carbon dioxide. - DO NOT USE HEAVY WATER STREAM			
Disposal of Substances & Contaminated Containers			
- Dispose of unused substance and containers only with authorised hazardous waste contractor. - Tripple rinsed containers can be disposed with general waste. - Collect spills with spill kit and dispose with hazadous waste contractor.			

Is exposure adequately controlled?	Yes [X] No [ ]
Risk Rating Following Control Measures	
High [ ] Medium [ ] Low [X]	

Appendix 6

COSHH Risk Assessment -

Product Name: Secover – MAPP N/A

Company name: Lower Hope Fruit Ltd	Dept: Fruit
Describe the activity or work process. *(Inc. how long/ how often this is carried out and quantity substance used)*	- **Product**: Plant protection product to be used as an insecticide. Professional and amateur use. - **Form**: Liquid, to be diluted in water - **Activity**: Substance is to be mixed with water into knapsack sprayer tank, then applied to crops with a hand lance.
Location of process being carried out?	Mixing to take place in designated area at Sidnall Farm by trained/ qualified operator. Spraying to take place in designated trial area on 'Field S' at Sidnall Farm.

Identify the persons at risk:	Employees [x]	Sub-contractors [ ]	Public [ ]

Name the substance involved in the process and its manufacturer. *(A copy of a current safety data sheet is attached to this assessment)*	Product – Silicone based product - 3-(polioksyetyleno) propyloheptametylotr isiloksan (1,1,1,3,5,5,5- Heptamethyl-3-(propyl(poly(EO))hydr oxy) Trisiloxane) Manufacturer – Synthos Agro Sp. z o.o.

Classification *(state the category of danger)*

[ ] Toxic		[ ] Oxidising		[ ] Gas Under Pressure	
[X] Harmful/ Irritant		[ ] Flammable		[ ] Carcinogen	
[ ] Corrosive		[ ] Explosives		[ ] Dangerous for the environment	

Hazard Type

Gas	Vapour	Mist	Fume	Dust	Liquid	Solid	Other (State)
[x]	[X]	[x]	[X]	[ ]	[X]	[ ]	[ ]

Route of Exposure

Inhalation	Skin	Eyes	Ingestion	Other (State)
[X]	[X]	[X]	[X]	[ ]

Workplace Exposure Limits (WELs) *please indicate n/a where not applicable*

N/A	Wear personal protective equipment at all times when handling/ mixing this substance. Handle in well ventilated area.

State the Risks to Health from Identified Hazards

- Harmful if inhaled
- Causes serious eye irritation
- Harmful to aquatic life with long lasting effects

Control Measures:			
Ensure all safety precautions are read and understood before handing substance Do not eat, drink or smoke around substance Always have access to spillage kit Always wash hands after use. Report any spills/ water course contamination to the Environment Agency,			
Is health surveillance or monitoring required? Yes [X] No [ ]			
Personal Protective Equipment *(state type and standard)*			
 Dust mask [ ]		 Visor [X]	Suitable for chemical splashes
 Respirator [ ]	Respirator with AEBKP filters - to prevent inhalation	 Goggles [ ]	Tight sealing goggles EN166 or equivalent
 Gloves [X]	Chemical resistant nitril gloves. Minimum 'EN 388' Rating.	 Overalls [X]	Chemical coverall. Minimum 'Type 6' – Chemical splash resistent
 Footwear [X]	Chemical & slip resistent rubber boots with steel safety toe protection. – EN13832 or equivalent	 Other [ ]	
First Aid Measures			
- **General measures** - If you feel unwell or experience any of the following, seek imidiate medical advice/ assistance, show chemical label/ data sheet - **After Inhilation** – Allow affected person to breathe fresh air. Allow affected person to rest - **After skin contact** – Remove affected clothing and wash all exposed skin with mild soap and water, followed by warm water rinse. - **Eye Contact** – Rinse immidiatetly with warm water for 15 minutes. Remove/ dispose of any contact lenses. - **Injestion** – Do not induce vomitting			
Storage			
- Store in well ventilated & bunded chemical store away from all drinks and foodstuffs - Ensure store is locked when not supervised by authorised personel - Ensure solids are stored above liquids - Store only in original container and keep cintainer closed when not in use			
Fire			
In event of fire, toxic fumes will be released. - Suitable extinguishing media: Water spray. Dry powder. Foam. Carbon dioxide. - DO NOT USE HEAVY WATER STREAM			
Disposal of Substances & Contaminated Containers			
- Dispose of unused substance and containers only with authorised hazardous waste contractor. - Tripple rinsed containers can be disposed with general waste. - Collect spills with spill kit and dispose with hazadous waste contractor.			

Is exposure adequately controlled?	Yes [X]	No [ ]
Risk Rating Following Control Measures		
High [ ]	Medium [ ]	Low [X]

Doc No: Secover	Issue No: 1	Issue Date: 01/09/2023	Created by: Emma Smith	Authorised by:	Page 2 of 2

Appendix 7

Insecticide

FLiPPER® is a contact insecticide for the useful control of whitefly, aphids and two-spotted mite on a range of protected crops.

An emulsion in water (EW) insecticide containing 479.8 g/litre (47.8% w/w) fatty Acids C7-C20.

MAPP 19154

The (COSHH) Control of Substances Hazardous to Health Regulations may apply to the use of this product at work (UK only).

Authorisation Holder:
Alpha BioPesticides Limited,
St John's Innovation Centre, Cowley Road,
Cambridge, CB4 0WS, United Kingdom.

Marketing Company:
Bayer CropScience Limited
230 Cambridge Science Park
Milton Road, Cambridge, CB4 0WB

Telephone: 01223 226500

For 24 hour emergency information contact Bayer CropScience Ltd.
Telephone: 00800 1020 3333

OF&G ORGANIC

Approved Product sopa Scottish Organic Producers Association

GB86770504c rA1a

Safety information

FLiPPER

Contains 479.8 g/litre (47.8% w/w) fatty Acids C7-C20.

WARNING.
Causes skin irritation.
Causes serious eye irritation.
May cause respiratory irritation.
Harmful to aquatic life with long lasting effects.

Avoid breathing vapours or spray.
Wash hands thoroughly after handling.
Use only in a well-ventilated area.
Avoid release to the environment.
Wear protective gloves/protective clothing/eye protection/face protection.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do—continue rinsing.
If eye irritation persists: Get immediate medical advice/attention.
IF ON SKIN: Wash with plenty of soap and water.
If skin irritation occurs: Get medical advice/attention.
Take off contaminated clothing and wash before reuse.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Get medical advice/attention.
Dispose of contents/container to a licensed hazardous-waste disposal contractor or collection site except for empty triple rinsed containers which can be disposed of as non-hazardous waste.

To avoid risk to human health and the environment, comply with the instructions for use.

IMPORTANT INFORMATION FOR USE ONLY AS A PROFESSIONAL INSECTICIDE
FLiPPER may only be used in a permanent glasshouse.

Crops:	Tomato (Permanent protection with full enclosure) Cucumber (Permanent protection with full enclosure) Strawberry (Permanent protection with full enclosure)
Maximum individual dose:	16 L product per hectare with a maximum concentration of 1.6 L per 100 L water.
Maximum number of treatments:	5 per crop.
Frequency of applications:	Apply every 7 days as required by pest pressure but do not apply more than three weekly applications consecutively.
Application timing:	Any time – No restriction.
Latest time of application:	No restriction.

Other specific restrictions:

1. Treatment must only be made under 'permanent protection' situations which provide full enclosure (including continuous top and side barriers down to below ground level) and which are present and maintained over a number of years.
2. Reasonable precautions must be taken to prevent access of birds, wild mammals and honey bees to treated crops.
3. To minimise airborne environmental exposure, vents, doors and other openings must be closed during and after application until the applied product has fully settled.

READ THE LABEL BEFORE USE. USING THIS PRODUCT IN A MANNER THAT IS INCONSISTENT WITH THE LABEL MAY BE AN OFFENCE. FOLLOW THE CODE OF PRACTICE FOR USING PLANT PROTECTION PRODUCTS.

flippersds

To access the **Safety Data Sheet** for this product scan the code or use the link below:

www.cropscience.bayer.co.uk/flippersds

or alternatively contact your supplier

GB86712016c rA1a

Bayer

SAFETY PRECAUTIONS

Operator Protection

Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment: WEAR SUITABLE PROTECTIVE CLOTHING (COVERALLS), SUITABLE PROTECTIVE GLOVES AND FACE PROTECTION (FACESHIELD) when handling the concentrate.

However engineering controls may replace personal protective equipment if a COSHH assessment shows that they provide an equal or higher standard of protection.

FLiPPER® has a reduced re-entry period, following application. Re-entry may occur as soon as the crop has dried.
WHEN USING DO NOT EAT, DRINK OR SMOKE. AVOID ALL CONTACT WITH SKIN.
WASH CONCENTRATE from skin or eyes immediately.
WASH HANDS AND EXPOSED SKIN before eating and drinking and after work.
DO NOT BREATHE SPRAY.
IF YOU FEEL UNWELL, seek medical advice (show label where possible).

Environmental Protection

Do not contaminate water with the product or its container.

Do not clean application equipment near surface water. Avoid contamination via drains from farmyards and roads.

Storage and Disposal

KEEP AWAY FROM FOOD, DRINK & ANIMAL FEEDING STUFFS.
KEEP OUT OF REACH OF CHILDREN.
KEEP IN ORIGINAL CONTAINER, tightly closed, in a safe place. Store in a well-ventilated place.
WASH OUT CONTAINER THOROUGHLY, empty washings into the spray tank and dispose of safely.
DO NOT RE-USE CONTAINER for any purpose.

DIRECTIONS FOR USE

Important: This information is authorised as part of the Product Label. All instructions within this section must be read carefully in order to obtain safe and successful use of this product.

Important: FLiPPER® is a contact insecticide.

Ensure good coverage of the pest and placement of the spray, paying particular attention to the underside of leaves and to growing points.

FLiPPER® has a zero day harvest interval for the crops on which its use is recommended.

Restrictions or warnings

Due to the large number of species and cultivars grown, crop safety should first be determined by treating a small number of plants. Crop damage may occur when FLiPPER® is applied under very high temperatures.

Pests Controlled

FLiPPER® will provide useful control of whitefly (*Trialeurodes vaporariorum, Bemisia tabaci, Aleurothrixus floccosus*), aphid (*Myzus persicae, Macrosiphum euphorbiae, Aphis gossypii*) and two-spotted mite (*Tetranychus urticae*) populations.

FLiPPER will control insects resistant to other insecticides. The impact in IPM/ICM programmes has not been established.

SAFETY PRECAUTIONS

Operator Protection

Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment: WEAR SUITABLE PROTECTIVE CLOTHING (COVERALLS), SUITABLE PROTECTIVE GLOVES AND FACE PROTECTION (FACESHIELD) when handling the concentrate.

However engineering controls may replace personal protective equipment if a COSHH assessment shows that they provide an equal or higher standard of protection.

FLiPPER® has a reduced re-entry period, following application. Re-entry may occur as soon as the crop has dried.
WHEN USING DO NOT EAT, DRINK OR SMOKE. AVOID ALL CONTACT WITH SKIN.
WASH CONCENTRATE from skin or eyes immediately.
WASH HANDS AND EXPOSED SKIN before eating and drinking and after work.
DO NOT BREATHE SPRAY.
IF YOU FEEL UNWELL, seek medical advice (show label where possible).

Environmental Protection

Do not contaminate water with the product or its container.

Do not clean application equipment near surface water. Avoid contamination via drains from farmyards and roads.

Storage and Disposal

KEEP AWAY FROM FOOD, DRINK & ANIMAL FEEDING STUFFS.
KEEP OUT OF REACH OF CHILDREN.
KEEP IN ORIGINAL CONTAINER, tightly closed, in a safe place. Store in a well-ventilated place.
WASH OUT CONTAINER THOROUGHLY, empty washings into the spray tank and dispose of safely.
DO NOT RE-USE CONTAINER for any purpose.

DIRECTIONS FOR USE

Important: This information is authorised as part of the Product Label. All instructions within this section must be read carefully in order to obtain safe and successful use of this product.

Important: FLiPPER® is a contact insecticide.

Ensure good coverage of the pest and placement of the spray, paying particular attention to the underside of leaves and to growing points.

FLiPPER® has a zero day harvest interval for the crops on which its use is recommended.

Restrictions or warnings

Due to the large number of species and cultivars grown, crop safety should first be determined by treating a small number of plants. Crop damage may occur when FLiPPER® is applied under very high temperatures.

Pests Controlled

FLiPPER® will provide useful control of whitefly (*Trialeurodes vaporariorum, Bemisia tabaci, Aleurothrixus floccosus*), aphid (*Myzus persicae, Macrosiphum euphorbiae, Aphis gossypii*) and two-spotted mite (*Tetranychus urticae*) populations.

FLiPPER will control insects resistant to other insecticides. The impact in IPM/ICM programmes has not been established.

Storage
Do not store diluted product.

Store concentrate in original container at ambient temperature in a dry place.

Protect concentrate from frost. Storage below 10°C may cause crystallization to occur. This is completely reversible and will not affect the effectiveness of the product.

EXTENSION OF USE:
Before use of FLiPPER under an Extension of Use Authorisation (EAMU) specified below, users must have a copy of the EAMU authorisation which can be downloaded from CRDs website, searching for 'MAPP 19154':

https://secure.pesticides.gov.uk/offlabels/search.asp

These extensions of the authorised use provide for the use of FLiPPER in respect of crops and situations other than those included on the product label (above). Neither the efficacy or the phytotoxicity of the product for which an Extension of authorisation has been granted have been assessed and, as such, the user bears the risk in respect of failures concerning its efficacy and phytotoxicity.

This product must only be applied in accordance with the terms of these extensions of authorisation, the product label and/or leaflet and any additional guidance on extensions of authorisation.

Extension of use – Outdoor and protected field vegetables:
This Extension of Authorisation relates to the use of 'FLiPPER' (M19154) for use on the field grown vegetables listed below for the control of thrips (*Thrips tabaci*), Aphids (*Aphididae*) and cabbage aphid.

Application is to be made using high-volume broadcast spray equipment, conventional hydraulic boom applicators or hand-held sprayers to outdoor crops in 300–500 litres water per hectare and to protected crops in 400–1000 litres water per hectare.

All protected uses include temporary protection and permanent protection with full enclosure.

Crops:	Outdoor crops of carrot, celeriac, horseradish, Jerusalem artichoke, parsley root, parsnip, radish, red beet, salsify, swede, turnip. Outdoor crops of bulb onion, garlic, salad onion, shallot. Outdoor crops of asparagus, celery, Florence fennel, Globe artichoke, leek, rhubarb. Outdoor crops of courgette and summer squash, sweetcorn, winter squash and pumpkin. Outdoor crops of broccoli / calabrese, Brussels sprout, cabbage, cauliflower, choi sum, collard kale, kohlrabi, oriental cabbage. Outdoor crops of beans without pods—fresh, broad bean (fresh), dwarf French bean, edible podded pea, lentil (fresh), runner bean, vining pea.
Maximum individual dose:	5 L product per hectare.

Maximum number of treatments:	9 per crop.
Frequency of applications:	A minimum interval of 7 days must be observed between applications and a minimum interval of 28 days must be observed between each block of 3 applications.
Application timing:	Application must only be made between 1 March and 30 August when applying to crops grown outdoors and under temporary protection.
Latest time of application:	No restrictions.

Crops:	Protected crops of asparagus, celery, Florence fennel, Globe artichoke, leek, rhubarb. Protected crops of courgette and summer squash, sweetcorn, winter squash and pumpkin. Protected crops of broccoli / calabrese, Brussels sprout, cabbage, cauliflower, choi sum, collard kale, kohlrabi, oriental cabbage Protected crops of beans without pods—fresh, broad bean (fresh), dwarf French bean, edible podded pea, lentil (fresh), runner bean, vining pea.
Maximum individual dose:	10 L product per hectare.
Maximum number of treatments:	8 per crop.
Frequency of applications:	A minimum interval of 7 days must be observed between applications and a minimum interval of 28 days must be observed between each block of 3 applications.
Application timing:	Application must only be made between 1 March and 30 August when applying to crops grown outdoors and under temporary protection.
Latest time of application:	No restrictions.

Restrictions related to these EAMUs:
The use of this product in recirculating water systems in a glasshouse may result in dilute pesticide waste that requires disposal. All dilute pesticide waste must be disposed of safely and legally to protect humans, wildlife and the environment, especially groundwater and surface water. Pesticide disposal advice is detailed in the 'Code of Practice for Using Plant Protection Products (Section 5: Disposing of Pesticide Waste)'.

Extension of use – Outdoor and protected leafy vegetables and fresh herbs:
This Extension of Authorisation relates to the use of 'FLiPPER' (M19154) on the leafy vegetables and fresh herbs listed below for the control of Aphids (*Aphididae*), Western Flower Thrip (*Frankliniella occidentalis*), thrips (*Thrips tabaci*) and spider mite (*Tetranychus urticae*).

Application is to be made using high-volume broadcast spray equipment, conventional hydraulic boom applicators or hand-held sprayers to outdoor crops in 300–500 litres water per hectare and to protected crops in 400–1000 litres water per hectare.

All protected uses include temporary protection and permanent protection with full enclosure.

Crops:	Outdoor crops of angelica, baby leaf crops, balm, basil, bay, caraway leaves, celery leaves, chervil, chives, coriander leaves, cress, dill leaves, edible flowers, endive, fennel leaves, herb - other, hyssop, lamb's lettuce, land cress, lettuce, lovage leaves, marjoram, mint, oregano, parsley, purslane, red mustard, rocket, rosemary, sage, salad burnet, savory, spinach, spinach beet, sweet cicely, tarragon, thyme, watercress in propagation. Outdoor crops of chamomile, ginkgo, ginseng, hibiscus flowers, jasmine flowers, lime flowers, mallow, rose petals, strawberry leaves, valerian.
Maximum individual dose:	5 L product per hectare.
Maximum number of treatments:	9 per crop.
Frequency of applications:	A minimum interval of 7 days must be observed between applications and a minimum interval of 28 days must be observed between each block of 3 applications.
Application timing:	Application must only be made between 1 March and 30 August when applying to crops grown outdoors and under temporary protection.
Latest time of application:	No restrictions.

Crops:	Protected crops of angelica, baby leaf crops, balm, basil, bay, caraway leaves, celery leaves, chervil, chicory (witloof), chives, coriander leaves, cress, dill leaves, edible flowers, endive, fennel leaves, herb—other, hyssop, lamb's lettuce, lettuce, lovage leaves, marjoram, mint, oregano, parsley, purslane, red mustard, rocket, rosemary, sage, salad burnet, savory, spinach, spinach beet, sweet cicely, tarragon, thyme, watercress in propagation. Protected crops of chamomile, ginkgo, ginseng, hibiscus flowers, jasmine flowers, lime flowers, mallow, rose petals, strawberry leaves, valerian.
Maximum individual dose:	10 L product per hectare.
Maximum number of treatments:	8 per crop.
Frequency of applications:	A minimum interval of 7 days must be observed between applications and a minimum interval of 28 days must be observed between each block of 3 applications.
Application timing:	Application must only be made between 1 March and 30 August when applying to crops grown outdoors and under temporary protection.
Latest time of application:	No restrictions.

Restrictions related to these EAMUs:
The use of this product in recirculating water systems in a glasshouse may result in dilute pesticide waste that requires disposal. All dilute pesticide waste must be disposed of safely and legally to protect humans, wildlife and the environment, especially groundwater and surface water. Pesticide disposal advice is detailed in the 'Code of Practice for Using Plant Protection Products (Section 5: Disposing of Pesticide Waste)'.

Extension of use – Outdoor and protected soft fruit

This Extension of Authorisation relates to the use of 'FLiPPER' (M19154) for use on the soft fruit listed below for the control of Aphids (*Aphididae*), two spotted spider mite (*Tetranychus urticae*), Western Flower Thrip (*Frankliniella occidentalis*), leaf hoppers, Strawberry blossom weevil (*Anthonumus rubi*), Thrips (*Thrips fuscipennis*) and white fly.

Application is to be made using high-volume broadcast spray equipment, conventional hydraulic boom applicators or hand-held sprayers to outdoor crops in 400–1000 litres water per hectare and to protected crops in 400–1000 litres water per hectare.

All protected uses include temporary protection and permanent protection with full enclosure.

Crops:	Protected and outdoor crops of bilberry, blackberry, blackcurrant and redcurrant, blueberry, cranberry, elderberry, gooseberry, loganberry and rubus hybrid, mulberry, raspberry, rose hips, strawberries.
Maximum individual dose:	10 L product per hectare.
Maximum number of treatments:	8 per crop.
Frequency of applications:	A minimum interval of 7 days must be observed between applications and a minimum interval of 28 days must be observed between each block of 3 applications.
Application timing:	Application must only be made between 1 March and 30 August when applying to crops grown outdoors and under temporary protection.
Latest time of application:	No restrictions.

Restrictions related to these EAMUs:
The following Aquatic Buffer Zones must be observed:

Crops/situations:	Aquatic buffer zone distance (metres):	Comment:
Bilberry, blackberry, blackcurrant and redcurrant, blueberry, cranberry, elderberry, gooseberry, loganberry and rubus hybrid, mulberry, raspberry, rose hips, strawberries.	10	DO NOT ALLOW DIRECT SPRAY from horizontal boom sprayers to fall within the distance specified for the crop to the top of the bank of a static or flowing water body, or within 1 m of the top of a ditch which is dry at the time of application. Aim spray away from water. ALL CROPS WITH A BUFFER ZONE GREATER THAN 5M ARE NOT ELIGIBLE FOR BUFFER ZONE REDUCTION UNDER THE LERAP HORIZONTAL BOOM SPRAYERS SCHEME.

This product qualifies for inclusion within the Local Environment Risk Assessment for Pesticides (LERAP) scheme. Before each spraying operation from a horizontal boom sprayer, either a LERAP must be carried out in accordance with CRD's published guidance or the statutory buffer zone as appropriate to the crop must be maintained. NOTE ALL BUFFER ZONES OF MORE THAN 5 M VIA HORIZONTAL BOOM SPRAYER ARE NOT REDUCIBLE. The results of the LERAP must be recorded and kept available for three years.

The use of this product in recirculating water systems in a glasshouse may result in dilute pesticide waste that requires disposal. All dilute pesticide waste must be disposed of safely and legally to protect humans, wildlife and the environment, especially groundwater and surface water. Pesticide disposal advice is detailed in the 'Code of Practice for Using Plant Protection Products (Section 5: Disposing of Pesticide Waste)'.

Extension of use – Tree fruit grown outdoor and under temporary protection

This Extension of Authorisation relates to the use of 'FLiPPER' (M19154) for use on Tree nuts, Pome fruit, Stone fruit and Wine grapes grown outdoors and under temporary protection as listed below. This Extension of Authorisation is for the control of Aphids (*Aphididae*), two spotted spider mite (*Tetranychus urticae*) and blossom weevil.

Application is to be made using broadcast air assisted fruit tree sprayers in 400–1000 litres water per hectare.

Crops:	Protected and outdoor crops of almond, apple, apricot, cherry, chestnut, hazelnut, peach and nectarine, pear, plum, quince, walnut, wine grapes.
Maximum individual dose:	10 L product per hectare.
Maximum number of treatments:	8 per crop.
Frequency of applications:	A minimum interval of 7 days must be observed between applications and a minimum interval of 28 days must be observed between each block of 3 applications.
Application timing:	Application must only be made between 1 March and 30 August when applying to crops grown outdoors and under temporary protection.
Latest time of application:	No restrictions.

Restrictions related to these EAMUs

To protect aquatic organisms respect an unsprayed buffer zone to surface water bodies in line with LERAP requirements.

DO NOT ALLOW DIRECT SPRAY from broadcast air-assisted sprayers to fall within 20 m of the top of the bank of a static or flowing water body, unless a Local Environment Risk Assessment for Pesticides (LERAP) permits a narrower buffer zone, or within 5 m of the top of a ditch which is dry at the time of application. Aim spray away from water.

This product qualifies for inclusion within the Local Environment Risk Assessment for Pesticides (LERAP) scheme. Before each spraying operation from a broadcast air-assisted sprayer , either a LERAP must be carried out in accordance with CRD's published guidance or the statutory buffer zone must be maintained. The results of the LERAP must be recorded and kept available for three years.

Appendix 8 - FLiPPER EAMU

Extension of Authorisation Number: 3419 of 2019

EXTENSION OF AUTHORISATION FOR A MINOR USE OF A PLANT PROTECTION PRODUCT

PLANT PROTECTION PRODUCTS REGULATION (EC) No. 1107/2009

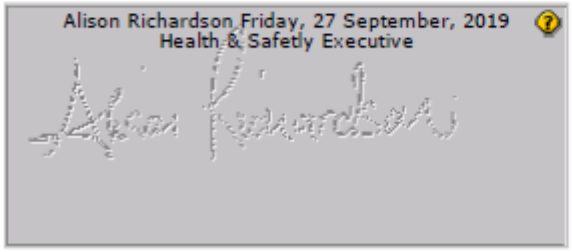
Product name:	FLiPPER
Active ingredient:	479.8 g / l fatty acids C7-C20
MAPP number:	19154
Product authorisation holder:	Alpha BioPesticides Limited (Registered Company no. 07535734)
Marketing company:	Bayer CropScience Limited

This Extension of authorisation ends: on the final expiry date of use for the authorised product (unless otherwise stated)

If the authorisation of the above product is withdrawn or amended before the end date above, this Extension of authorisation will end on the same date as the authorisation for the product. This Extension of authorisation will be withdrawn or amended before its end date if a decision is taken to withdraw or amend this Extension of authorisation under Regulation (EC) No 1107/2009 on any other grounds.

Extent of authorisation: United Kingdom

This extension of authorisation for minor uses applies to all UK parallel trade products issued under Article 52 of Regulation (EC) No 1107/2009 for which FLiPPER with MAPP 19154 is the reference product.



HSE Digital Signature

This and the attached Appendices 1 and 2 are signed by the Health and Safety Executive ("HSE") for and on behalf of the Secretary of State, the Welsh Ministers,

the Scottish Ministers and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland.

Date of issue: 27 September 2019

EXPLANATORY NOTES

1. This is Extension of authorisation number 3419 of 2019.

2. This Extension of authorisation will be published on the website of the Chemicals Regulation Division of the HSE.

3. Application reference number: COP 2018/01301

4. Persons using the product to which this Extension of authorisation applies should acquaint themselves with and observe all requirements contained in the Regulation (EC) No 1107/2009, including the duty on the holder of any Extension of authorisation to notify information on potentially dangerous effects, a contravention of which is a criminal offence under those Regulations.

5. Neither the efficacy nor the phytotoxicity of the product for which this Extension of authorisation has been granted has been assessed and, as such, the user bears the risk in respect of failures concerning its efficacy and phytotoxicity.

ADVISORY INFORMATION

IMPORTANT: When applying this product under the terms of this Extension of Authorisation, comply with any resistance guidance or restrictions stated on the product label.
Total reliance on one pesticide will hasten the development of resistance. Pesticides of different chemical types or alternative control measures should be included in the planned programme. Alternating with different modes of action is a recognised anti-resistance strategy.

This Extension of Authorisation relates to the use of 'FLiPPER' (M19154) for use on Tree nuts, Pome fruit, Stone fruit and Wine grapes grown outdoors and under temporary protection as listed below. This Extension of Authorisation is for the control of Aphids (*Aphididae*), two spotted spider mite (*Tetranychus urticae*) and blossom weevil.

Application is to be made using broadcast air assisted fruit tree sprayers in 400-1000 litres water per hectare.

APPENDIX 1: CONDITIONS OF EXTENSION OF AUTHORISATION

The conditions below are obligatory. They must be complied with when the Extension of authorisation occurs. Failure to comply with the following conditions will result in the withdrawal or amendment of the Extension of authorisation under Regulation (EC) No 1107/2009 and may result in other enforcement action, including prosecution. For the purposes of this Extension of authorisation only, the conditions and/or requirements shown below supersede any corresponding conditions and/or requirements set out on the label or otherwise provided for under the product authorisation **which would otherwise apply**.

Use:

Field of use: **ONLY AS AN INSECTICIDE**

User: Professional

Crops/situations:	Maximum individual dose: (litres product / ha)	Maximum total dose:	Maximum number of treatments: (per crop)	Latest time of application:
Protected and outdoor crops of almond, apple, apricot, cherry, chestnut, hazelnut, peach and nectarine, pear, plum, quince, walnut, wine grapes	10	-	8	-

Operator Protection:

(1) Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment:

Operators must wear suitable protective clothing (coveralls), suitable protective gloves and face protection (faceshield) when handling the concentrate.

(2) However, engineering controls may replace personal protective equipment if a COSHH assessment shows that they provide an equal or higher standard of protection.

Environmental protection:

(1) Since there is a risk to aquatic life from use, users not applying the statutory buffer zone must either themselves carry out, or ensure that someone else has carried out a Local Environment Risk Assessment for Pesticides (LERAP) on their behalf before each spraying operation from a broadcast air-assisted sprayer. Users must not allow direct spray from such sprayers to fall within 20m of the top of the bank of any static or flowing waterbody or within 5m of a ditch which is dry at the time of application (these distances to be measured as set out in the booklet 'Local Environment Risk Assessment for Pesticides - Broadcast Air-assisted Sprayers' - and any amendments that are made to it) unless:

(a) The LERAP indicates that a narrower buffer zone will be sufficient; and

(b) Any measures indicated by the LERAP as justifying the narrower buffer zone are complied with in full and in accordance with any conditions applicable to them.

Spray must be aimed away from water.

(2) The results of the LERAP must be recorded in written form and must be available for a period of three years for inspection to any person entitled to exercise enforcement powers under or in connection with the Plant Protection Products Regulations 2011 or the Plant Protection Products (Sustainable Use) Regulations 2012. (An electronic record will satisfy the requirement for a written record, providing it is similarly available for inspection and can be copied).

(3) Detailed guidance on LERAPs and how to conduct a LERAP are contained in the booklet 'Local Environment Risk Assessment for Pesticides - Broadcast Air-assisted Sprayers' (Ref: PB6533), available from HSE Chemicals Regulation Division's website. All LERAPs must be carried out in accordance with this Guidance and any amendments that are made to it.

Other specific restrictions:

(1) This product must only be applied in accordance with the terms of this extension of authorisation, the product label and/or leaflet and any additional guidance on extensions of authorisation.

(2) Application must only be made between 1 March and 30 August when applying to crops grown outdoors and under temporary protection.

(3) This product qualifies for inclusion within the Local Environment Risk Assessment for Pesticides (LERAP) scheme for broadcast air-assisted sprayers. Before each spraying operation from a broadcast air-assisted sprayer, either a LERAP must be carried out in accordance with the 'Local Environment Risk Assessment for Pesticides Broadcast Air-Assisted Sprayers' booklet available from the HSE Chemicals Regulation Division's website or the statutory buffer zone must be maintained. The results of the LERAP must be recorded and kept available for three years.

(4) A minimum interval of 7 days must be observed between applications and a minimum interval of 28 days must be observed between each block of 3 applications.

APPENDIX 2: GENERAL CONDITIONS FOR AN EXTENSION OF AUTHORISATION

Failure to comply with the following conditions will result in the withdrawal or amendment of the Extension of authorisation under Regulation (EC) No 1107/2009 and may result in other enforcement action, including prosecution.

Adverse effects:

The authorisation holder must immediately notify the Secretary of State, the Scottish Ministers and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland (care of the Health and Safety Executive), if they have any new information on the potentially adverse effects of the authorised product, or of residues of an active substance in that product when used in accordance with the conditions of this Extension of authorisation. For those products authorised under Regulation (EC) No 1107/2009 authorisation holders must also tell the other relevant competent authorities of the EC Member States (a list of which is available from the Health and Safety Executive) and the EC Commission. Failure to comply with this requirement is an offence.

Provision of information:

The authorisation holder must comply with all requests for information required by, or on behalf of, the Secretary of State, the Scottish Ministers or the Department of Agriculture, Environment and Rural Affairs in Northern Ireland in accordance with Regulation (EC) No 1107/2009.

Appendix 9 - Kanemite®SC Label

KANEMITE® SC

GROUP 20B INSECTICIDE

MAPP 19281

A suspension concentrate containing 164 g/L acequinocyl for use as an acaricide for control of two-spotted spider mite *(Tetranychus urticae)* and fruit tree red spider mite (*Panonychus ulmi)* in pome fruit and stone fruit.

I

Batch no:

Pack size:

THE (COSHH) CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS MAY APPLY TO THE USE OF THIS PRODUCT AT WORK.

SAFETY PRECAUTIONS

Operator protection
Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment:
WEAR SUITABLE PROTECTIVE CLOTHING (COVERALLS) AND SUITABLE PROTECTIVE GLOVES when handling the concentrate.
WEAR SUITABLE PROTECTIVE GLOVES when applying by broadcast air-assisted equipment.
However, other engineering controls in addition to those specified above may replace personal protective equipment if a COSHH assessment shows they provide an equal or higher standard of protection.
WASH CONCENTRATE from skin or eyes immediately
WASH HANDS AND EXPOSED SKIN before meals and after work
WHEN USING, DO NOT EAT DRINK OR SMOKE
IF YOU FEEL UNWELL, seek medical advice immediately (show the label where possible)

Worker Protection
Engineering control of worker exposure must be used where reasonably practicable in addition to the following personal protective equipment:
DO NOT HANDLE TREATED CROPS for at least 4 days after treatment.
WEAR SUITABLE PROTECTIVE GLOVES* when handling treated crops within 12 days after treatment. *Meeting at least glove safety standard EN374-2:2014, Level 2. Such gloves can be identified by a CE Mark with four digits below, and the EN374 pictogram for micro-biological hazards.
However, other engineering controls in addition to those specified above may replace personal protective equipment if a COSHH assessment shows they provide an equal or higher standard of protection.

Environmental protection
Do not contaminate water with the product or its container. Do not clean application equipment near surface water. Avoid contamination via drains from farmyards and roads.
To protect aquatic organism respect an unsprayed buffer zone to surface water bodies in line with LERAP requirements.
DO NOT ALLOW DIRECT SPRAY from broadcast air-assisted sprayers to fall within 20m for applications before BBCH 70 and 15m for applications after BBCH 70 of the top of the bank of

any static or flowing waterbody or within 5m of a ditch which is dry at the time of the application. Aim spray away from water.

This product qualifies for inclusion within the Local Environment Risk Assessment for Pesticides (LERAP) scheme for broadcast air-assisted sprayers. Before each spraying operation from a broadcast air-assisted sprayer, either a LERAP must be carried out in accordance with the 'Local Environment Risk Assessment for Pesticides Broadcast Air-Assisted Sprayers' booklet available from the HSE Chemicals Regulation Division's website or the statutory buffer zone must be maintained. The results of the LERAP must be recorded and kept available for three years

Storage and disposal
KEEP IN ORIGINAL CONTAINER, tightly closed, in a safe place.
WASH OUT CONTAINER THOROUGHLY, empty washings into the spray tank and dispose of the container safety
Store product in a cool, dry place.
KEEP AWAY FROM FOOD, DRINK AND ANIMAL FEEDING STUFFS.
PROTECT FROM FROST

IMPORTANT INFORMATION

FOR USE ONLY AS A PROFESSIONAL HORTICULTURAL INSECTICIDE

Crops/ situations:	Maximum individual dose: (litres product / ha)	Maximum total dose:	Maximum number of treatments: (per 12 months)	Latest time of application:
Apple (outdoor), Pear (outdoor)	0.9 L/ha	-	1	30 days before harvest
Cherry (outdoor), Plum (outdoor)	0.9 L/ha	-	1	21 days before harvest

Other specific restrictions:

1) The maximum concentration of 0.09% (90ml per 100 L of water) must not be exceeded.
2) The product must not be applied via hand-held equipment

READ THE LABEL BEFORE USE. USING THIS PRODUCT IN A MANNER THAT IS INCONSISTENT WITH THE LABEL MAY BE AN OFFENCE. FOLLOW THE CODE OF PRACTICE FOR USING PLANT PROTECTION PRODUCTS

Appendix 10 – Majestik Label

INSECTICIDE 

MAJESTIK
MAPP 17240/PCS 05677

A fast acting, contact insecticide in a soluble concentrate formulation containing 598 g/l (49% w/w) of maltodextrin for the control of spider mites and white fly in all outdoor and protected crops

5 litres e
Batch No. and manufacturing date: See Packaging

THE (COSHH) CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS MAY APPLY TO THE USE OF THIS PRODUCT AT WORK – UK ONLY

SAFETY PRECAUTIONS

Operator Protection
Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment:
WEAR SUITABLE PROTECTIVE CLOTHING (COVERALLS), SUITABLE PROTECTIVE GLOVES AND EYE PROTECTION (GOGGLES) when handling the concentrate.
However, engineering controls may replace personal protective equipment if a COSHH assessment shows they provide an equal or higher standard of protection.
WHEN USING DO NOT EAT, DRINK OR SMOKE
WASH CONCENTRATE from eyes immediately
WASH HANDS AND EXPOSED SKIN before eating and drinking and after work
DO NOT BREATHE SPRAY

Environmental Protection
Do not contaminate water with the product or its container. Do not clean application equipment near surface water/avoid contamination via drains from farmyards and roads.
Dangerous to bees. To protect bees and pollinating insects do not apply to crop plants when in flower. Do not use where bees are actively foraging. Do not apply when flowering weeds are present.
RISK TO NON-TARGET INSECTS OR OTHER ARTHROPODS. See Directions for use.

Storage and disposal
KEEP AWAY FROM FOOD, DRINK AND ANIMAL FEEDING STUFFS.
KEEP OUT OF REACH OF CHILDREN .
KEEP IN ORIGINAL CONTAINER, tightly closed, in a safe place.
WASH OUT CONTAINER THOROUGHLY, empty washings into the spray tank and dispose of safely

IMPORTANT INFORMATION
FOR USE ONLY AS A PROFISSIONAL INSECTICIDE

Crops: All outdoor and protected crops
Maximum individual dose: 25ml per litre of water
Maximum number of treatments: 20 per crop
Latest time of application: No restrictions
Other specific restrictions: The maximum concentration must not exceed 25 ml of product per 1 litre water.

READ THE LABEL BEFORE USE. USING THIS PRODUCT IN A MANNER THAT IS INCONSISTENT WITH THE LABEL MAY BE AN OFFENCE. FOLLOW THE CODE OF PRACTICE FOR USING PLANT PROTECTION PRODUCTS.

MAJESTIK
A fast acting insecticide in a soluble concentrate formulation containing 598 g/l (49% w/w) of maltodextrin for the control of spider mites and whitefly in all outdoor and protected crops.

WARNING
CAUSES SERIOUS EYE IRRITATION

Keep out of reach of children
Wash hands thoroughly after handling
Wear protective gloves, protective clothing, eye protection/face protection
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Dispose of contents/container to a licensed hazardous-waste disposal contractor or collection site except for triple rinsed empty clean containers which can be disposed of as non-hazardous waste

To avoid risks to man and the environment comply with the instructions for use

MAPP 17240/ PCS 05677

This label is compliant with the CPA Voluntary Initiative Guidance- UK only

Marketed by:

CERTIS

Certis, Suite 5, 3 Riverside, Granta Park, Great Abington, Cambridgeshire. CB21 6AD. Tel: 0044 (0)845 373 0305 Fax: 0044 (0)1223 894261
E-mail: certis@certiseurope.co.uk

For technical and non-emergency calls - phone 0044 (0)1223 894261

For advice on medical emergencies, fires, spillages or chemical hazards ONLY – phone 0870 190 6777
Approval Holder: Certis, Suite 5, 3 Riverside, Granta Park, Great Abington, Cambridgeshire. CB21 6AD
® Majestik is a registered trademark of Certis Europe BV

CONDITIONS OF SUPPLY: The Seller warrants that the goods shall at the time of delivery to the Buyer conform to the Seller's standard specification but all other conditions and warranties, whether express or implied by statute or custom of the trade or otherwise and whether as to condition, quality, performance, merchantability, fitness for any purpose or otherwise, are expressly excluded and, subject as aforesaid, the Seller shall be under no liability whatsoever, in contract or in tort, for or in respect of any loss or damage whatsoever resulting from or arising out of the goods or supply or use thereof, whether caused by the negligence of the Seller or otherwise. The Seller shall be under no liability in respect of the warranty given above unless the Buyer allows the Seller reasonable opportunity of inspecting the goods where practicable. A consumers statutory rights are not affected.

DIRECTIONS FOR USE

IMPORTANT: This information is approved as part of the Product Label. All instructions within this section must be read carefully in order to obtain safe and successful use of this product.

MODE OF ACTION

Majestik has a physical mode of action, blocking the spiracles of the pest leading to suffocation and will give high levels of control from multiple applications. The maximum effect will normally be seen within 2-4 hours after application. Further mortality will then only be seen following repeat applications.

Application rate: 25ml of Majestik per litre of water.

IMPORTANT

Majestik has a contact mode of action. Ensure good coverage and contact of pest. Spray to run off. Ensure that the plant is thoroughly covered, paying special attention to the underside of leaves and to growing points. Majestik is most effective in quick drying conditions.

APPLICATION
For pesticides to work effectively it is important to get good crop coverage. Frequently cases of supposed pesticide failure are actually the result of poor crop coverage.
The best available application technique, which minimises off-target drift, should be used to reduce effects on non-target insects or other arthropods
Avoid spraying within 5 m of the field boundary to reduce effects on non-target insects or other arthropods

Handheld applicators: A hand lance is recommended. For best results use a flat fan nozzle. Target spray to the underside of leaves and to growing points.

Boom sprayers: Application rates in the region of 1000 to 3000 l/ha applied with 80° flat fan nozzles, spaced 30cm apart with an operating pressure of 2.5 to 3.0 bar. Angle the nozzle 45° upwards from the horizontal on the boom. At a nominal walking speed of 1 m/s this can be achieved with a nozzle flow rate of 1.2 l/min. For this, the nozzle type '03f80' is needed.
Spider mites migrate to the top of the plant canopy as the season progresses. Therefore to target this area it is important to match the height of the boom/spray to the height of the canopy

Mixing: Fill sprayer with half the required volume of water (using mains water) and commence agitation. Add measured quantity of Majestik. Complete filling of sprayer with water to the required volume. Ensure product is thoroughly mixed before application.

STORAGE
Do not store diluted product, always use immediately after mixing. Store concentrate at ambient temperature in a dry place.

Zero day harvest interval and zero re entry period.

Target Pests:

PEST	STAGE TARGETED	APPLICATION METHOD	FURTHER APPLICATIONS
Spider mites	Adults and Nymphs	2 applications 4-7 days apart. The second of these application kills newly emerged nymphs.	Repeat applications of Majestik or the introduction of biological control agents may be needed to maintain control.
Whitefly	Eggs, Larvae, Pupae and Adults	2 applications 4-7 days apart.	
Aphids*	Adults and Nymphs	1 application to hot spots. Repeat as required	

*Very limited data suggest some reduction of aphids may be achieved.

CROP SAFETY
Due to the diversity of crops that may be treated, it is important that a few plants should be tested before treating wider areas. Avoid application to the flowers of ornamental species. A sticky residue may be left on fruit such as tomatoes.

INTEGRATED PEST MANAGEMENT
Majestik can have adverse effects on non-target insects or other arthropods that are hit by spray but has no residual effect. Beneficials can be reintroduced into the crop after application once the crop has dried.

RESISTANCE
Majestik has not been reported to have any insect resistance. However, it is good practice to use such products as components of Integrated Pest Management systems, alternating with other control measures. This is particularly important for sequential crops

END OF LABEL TEXT

Section 6 of the Health and Safety at Work Act
Additional Product Safety Information
(This section does not form part of the product label under the Plant Protection Products Regulations(as amended)).
The product label provides information on a specific pesticidal use of the product; do not use otherwise, unless you have assessed any potential hazard involved, the safety measures required and that particular use has "off-label" approval or is otherwise permitted under the Plant Protection Products Regulations. The information on this label is based on the best available information including data from test results.

Safety Data Sheet
To access the Safety Data Sheet for this product, scan the QR code or use the web-link below:

URL:
http://www.certiseurope.co.uk/fileadmin/downloads_uk/products/insecticides/Majestik_MSDS.pdf

Alternatively, contact your supplier.

Appendix 11 – ProTAC ®SF Label

Appendix 12 – SB Plant Invigorator Label

INSECTICIDE / FUNGICIDE

SB PLANT INVIGORATOR

Contains a unique blend of plant safe, physical pest control surfactants.

Controls a wide range of important pest species including whitefly, aphid, spider mite, mealybug, scale and psyllid.
Controls powdery mildew.

The product works as an insecticide / acaricide / fungicide by a physical mode of action.

Can be used on all edible and ornamental crops.

No harvest interval.

Pests will not become resistant.

Plant wash for a cleaner shiny appearance.

fargro®
Ask the Specialists!

Fargro Ltd
Vinery Fields, Arundel Road,
Poling, Arundel,
West Sussex
BN18 9PY
Tel: +44 (0)1903 721591
Email: info@fargro.co.uk
www.fargro.co.uk

ALWAYS READ THE LABEL.

SB PLANT INVIGORATOR

- Controls a wide range of important pest species by physical means.
- Usable on edible and ornamental crops.
- No harvest interval required.
- Can be used as a plant wash to give a cleaner shiny appearance.
- Controls powdery mildew.
- Suitable for use throughout the year.

The following text is taken from the label:

DIRECTIONS FOR USE

CONTROLS a wide range of important pest species that include whitefly, aphid, spider mite, mealybug, scale and psyllid. Due to the physical mode of action these pests will not become resistant to SB PLANT INVIGORATOR.

For use on all edible and ornamental crops.

✓ Physical mode of pest and mildew control.
✓ Pests will not become resistant.
✓ No harvest interval.
✓ Suitable for use throughout the year.
✓ Plant wash for a cleaner, shiny appearance.
✓ Excellent shelf life.

DIRECTIONS

SHAKE BOTTLE WELL BEFORE USE.
To avoid excessive foaming put required amount of water into spray tank and add SBPI, then agitate well. Only apply diluted. Do not exceed the appropriate application rates. For maximum effect spray the upper and lower leaf surfaces thoroughly on a weekly basis. Reseal container after use. Store out of direct sunlight above 10°C and below 25°C.

For best results spray weekly.

DILUTION RATE:

Professional formulation:

100ml concentrate to 100 litres water.

Garden / Retail:

10 ml concentrate to 1 litre water.

(The concentrations and rates of use differ see pack size information on page 4).

NOTE:

Ensure spraying equipment is washed out before use. Some varieties may be susceptible to scorch, especially in hot conditions (advisable to spray small trial area first). We cannot accept liability that directly or indirectly results from using, transporting and/or stocking this product.

Warnings and precautions for the professional and garden / retail formulations:

Warning
Causes skin irritation
Causes serious eye irritation.

Precautionary Statements:
Wear protective gloves.
IF ON SKIN: Wash with plenty of soap and water.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Do not eat drink or smoke when using this product.
Keep out of reach of children.
If medical advice is needed, have product container or label at hand.

Precautions for the ready to use formulation:
Keep spray off skin and away from eyes.
If splashed in eyes or on skin wash in clean water.
Keep out of reach of children.

TECHNICAL NOTE FOR SB PLANT INVIGORATOR

There is an ongoing trials programme which so far has revealed the following guidance for use.

PESTS AND DISEASE CONTROLLED

Trials work has shown a broad range of pest species can be controlled including: aphids (a wide range of species), whitefly, spider mites, mealybugs, hard scale, soft scale, bay sucker psyllids and also powdery mildew.

MODE OF ACTION

There is no residual effect. The product works by physical means and is only effective when in direct contact with the pest.

Two separate modes of action have been observed:
- adult whitefly have been observed to stick by the wings to any surface they make contact with.
- aphids, juvenile whitefly and spider mite if directly hit are trapped by its wetness.

On mealybug an initial application removed the protective wax and a second application controlled them.

FREQUENCY OF APPLICATION

Weekly or fortnightly applications are recommended to ensure plants remain pest free and healthy.

It is advisable to treat plants heavily infested with pests at 2 or 3 day intervals before weekly or fortnightly applications commence. This ensures that difficult to control stages of the pest - eggs and pupae are dealt with and large amounts of protective wax produced by some species such as mealybugs, woolly aphid, mealy cabbage aphid etc. is overcome.

Heavy infestations of red spider mite will also require 2 or 3 repetitive applications to overcome the protective webbing and difficult to control eggs.

Weekly applications can effectively prevent powdery mildew from infesting plants as well as controlling an infestation.

CROP SAFETY

SB PLANT INVIGORATOR has been extensively tested at the recommended dose rate and frequency on many plant species and varieties to determine their susceptibility to phytotoxicity.
These include plants within the following families:

Asteraceae (Compositae) (eg aster, *Ageratum*, *Dahlia*, sunflower, lettuce etc.).
Brassicaceae (eg cabbage, turnip, rape, swede, broccoli etc.).
Caprifoliaceae (eg honeysuckle).
Chenopodiaceae (eg sugarbeet, beetroot, spinach etc.).
Convolvulaceae (eg *Ipomoea*, sweet potato, morning glory etc.).
Cucurbitaceae (eg melon, cucumber, pumpkin, squash, marrow etc.).
Euphorbiaceae (eg *Euphorbia*, *Croton*, Poinsettia).
Fabaceae (Leguminosae) (eg peas, beans, lupin, trefoil, clover etc.).
Geraniaceae (eg *Geranium*, *Pelargonium* etc.).
Iridaceae (*Freesia*, Gladioli etc.).
Liliaceae (eg *Asparagus*, onion, garlic, chives, lilies etc.).
Malvaceae (eg *Abutilon*, cotton, *Hibiscus*, *Malva* etc.).
Musaceae (eg banana).
Orchidaceae (orchids).
Poaceae (Gramineae) (eg grasses, maize etc.).
Primulaceae (eg *Primula*, primrose, cycla-

men etc.)
Rosaceae (eg rose, *Prunus*, apple, strawberry etc.).
Solanaceae (eg pepper, tomato, potato, chilli, *Datura*, *Nicotiana*, aubergine).
Vitaceae (eg grape).
No adverse effects have been recorded on any of the plants tested.

FURTHER ADVICE

Make sure all spraying equiment is washed clean of previous chemical residue before mixing and applying SB PLANT INVIGORATOR.

Due to the washing action of SB PLANT INVIGORATOR other products that have previously been sprayed may concentrate previous treatments at the run-off points on leaves and petals and cause scorching.

EFFECTS ON BENEFICIAL INSECTS

Studies so far have shown SB PLANT INVIGORATOR to be compatible within an integrated pest management programme where beneficial insects are used.

Parasitic wasps developing within aphid and whitefly mummies do not appear affected.

Soil dwelling predatory mites such as *Hypoaspis* do not appear affected although leaf dwelling mites *Amblyseius* and *Phytoseiulus* are affected by multiple applications.

Robust predators such as ladybirds, mirid bugs, hoverfly and lacewing larvae appear unaffected.

Bumble bees appear unaffected.

SB PLANT INVIGORATOR has a physical mode of action and is not required to be registered as a plant protection product.

SB PLANT INVIGORATOR is manufactured in Guernsey by Stan Brouard Limited.

Stan Brouard Limited
Landes du Marche
Vale
Guernsey
GY1 3FE
United Kingdom
Telephone 01481 252521
Email: info@sbpi.co.uk

Pack Sizes:
Professional formulation: 1 litre outer of 10
5 litre outer of 4
Garden / Retail formulation: 500 ml outer of 20
250 ml outer of 25
Ready to use formulation: 500 ml x 20

Safety data sheet available on request.

Distributed in the UK mainland by Fargro Ltd.

SECOVER

synthos AGRO

SECOVER is a silicone based product in the form of a concentrate for the preparation of an aqueous emulsion, with a physical mode of action, intended to combat some pests, including spider mites and aphids in the cultivation of fruit, vegetable and ornamental plants. SECOVER is used as an intervention when the first colonies of harmful insects and mites appear on plants.

Manufacturer:
Synthos Agro Sp. z o.o., ul. Chemików 1, 32-600 Oświęcim
tel.: + 48 33 847 47 77, fax:+48 33 847 47 78,
e-mail: rejestracja@synthosgroup.com

The preparation is intended for use by professional and amateur users.

DIRECTIONS FOR USE
SECOVER is a silicone based product with a physical mode of action. After dilution in water and spraying onto infested plants it spreads quickly on treated surface and then creates grid structure (breathable film). The resulting structure covers the pests very tightly and neutralizes them, eventually leading to their death. SECOVER is not a plant protection product under the Regulation (EC) No 1107/2009 and does not contain any chemical active substances. The SECOVER preparation is effective in controlling pests (including aphids and spider mites) occurring commonly and annually, often in large numbers on many plant species.

PRODUCT APPLICATION
The preparation is used in the form of a spray, after dilution in water. The product is intended for use with field, orchard and manual sprayers. The use of SECOVER does not require the addition of adjuvants to the working solution. SECOVER should be used when the first colonies of pests appear. The preparation maintains its effectiveness for up to 14 days after the application. If necessary, repeat the treatment after 14 days.

1. FRUIT PLANTS
Pome fruit (apple, pear) and stone fruit (plum, cherry, apricot, peach):
aphids, spider mites
- recommended concentration: 0.2% (200 ml of the preparation in 100 l of water)

Plum, apple tree, pear
soft scale larvae
- recommended concentration: 0.1% - 0.15% (100 - 150 ml of the preparation in 100 l of water)

The preparation at a concentration of 0.05% (50 ml in 100 l of water) reduces the occurrence of the pest.

Berry plants (currant, raspberry, strawberry)
aphids, spider mites
- recommended concentration: 0.2% (200 ml of the preparation in 100 l of water)

Recommended amount of water: 500 - 750 l / ha
Number of treatments: the product can be used repeatedly during the growing season, depending on the threat and frequency of pests.

COMMENTS:
1.SECOVER does not cause any symptoms of phytotoxicity on the plum of the variety 'Amers', on the apple of the variety 'Jonagold', on the black currant of the variety 'Gofert'. It is recommended, however, that before applying the preparation on each variety sprayed for the first time, to carry out a trial treatment on several plants to check for signs of phytotoxicity or damage to the plants.
2. Use before and after flowering of fruit trees and shrubs/bushes.

2. VEGETABLE PLANTS
Tomato, beans, broad beans, beetroot, black salsify, spinach, rhubarb, poppy seeds
aphids
- recommended concentration: 0.05% - 0.1% (50 ml-100 ml of the preparation in 100 l of water)

Tomato, cucumber and other cucurbits, beans and other coarse-grained legumes
spider mites
- recommended concentration: 0.2% (200 ml of the preparation in 100 l of water)

Brassica plants (kale, curly kale, chinese cabbage, broccoli, cauliflowers)
whitefly
- recommended concentration: 0.1% (100 ml of the preparation in 100 l of water)

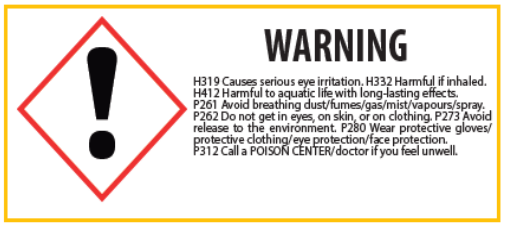
Recommended amount of water: 300 - 600 l / ha
Number of treatments: the product can be used repeatedly during the growing season, depending on the threat and frequency of pests.

3. ORNAMENTAL PLANTS
aphids
- recommended concentration: 0.05% - 0.1% (50 ml - 100 ml of the preparation in 100 l of water)

Use the higher recommended concentration in the case of the high pest severity.
If necessary, repeat the treatment after 14 days.
spider mites
- recommended concentration: 0.1 - 0.15% (100 - 150 ml of the preparation in 100 l of water)

If necessary, repeat the treatment after 7 days.
Recommended amount of water: 500 - 2000 l / ha
Number of treatments: the product can be used repeatedly during the growing season, depending on the threat and frequency of pests.

PRECAUTIONS, SPECIAL CONDITIONS AND RECOMMENDATIONS CONCERNING THE USE OF SECOVER IN ACCORDANCE WITH GOOD AGRICULTURAL PRACTICE
1. The preparation should be used out of bee activity periods, on dry and undamaged plants. 2.The product should be used in the morning, during the day only in cloudy weather, thoroughly covering with working solution all places where pests feed. 3. The preparation should not be used at least 2 hours before the expected rainfall, as it may wash off the preparation from sprayed plant surfaces and reduce the effectiveness. 4. When controlling spider mites, spray the lower and upper sides of the leaf thoroughly. 5. When spraying, do not allow the working solution to drip from the leaves to avoid any potential danger for more sensitive plants. 6. During the phytotoxicity studies of the SECOVER preparation on selected species and varieties of fruit, vegetable and ornamental plants, no symptoms of phytotoxicity were found. It is recommended, however, that before using the preparation, a trial treatment should be carried out on several plants sprayed for the first time to check for signs of phytotoxicity. 7. The preparation should not be used together with adjuvants or wetting agents. 8. Use the preparation only in recommended concentrations. 9. The amount of water used for the treatment should be adjusted to the size and density of crops.10. If it is necessary to perform a treatment against fungal diseases, the treatment with the chosen fungicide in the concentration specified in its label, it should be performed no earlier than 3 days after applying SECOVER on the plant.



WARNING

H319 Causes serious eye irritation. H332 Harmful if inhaled. H412 Harmful to aquatic life with long-lasting effects. P261 Avoid breathing dust/fumes/gas/mist/vapours/spray. P262 Do not get in eyes, on skin, or on clothing. P273 Avoid release to the environment. P280 Wear protective gloves/ protective clothing/eye protection/face protection. P312 Call a POISON CENTER/doctor if you feel unwell.

PREPARING THE WORKING SOLUTION
Before preparing the working solution, determine the exact amount needed. Pour the measured amount of SECOVER preparation into the sprayer tank partially filled with water. Rinse empty containers three times with water, and pour the washings into the sprayer tank with the working solution and top up with the necessary amount of water. Then mix the liquid thoroughly.

PRECAUTIONS FOR PEOPLE USING SECOVER
Do not eat, drink or smoke while using the product. Use protective gloves, eye and face protection while preparing the working liquid and during the application. Wash hands thoroughly after use. Avoid breathing spray. Do not step until the working liquid is completely dry on the plant surface.

PRECAUTIONS RELATED TO ENVIRONMENTAL PROTECTION
It is recommended to use the product apart from the periods of activity of bees and other pollinating insects. During the field efficacy studies, it was not observed that product SECOVER had a negative effect on beneficial organisms and the environment. Do not pollute water with the product or its packaging. Do not wash the equipment in the vicinity of surface water. Avoid contamination of waters through drainage ditches from farms and roads.

PRODUCT STORAGE CONDITIONS
Keep away from children. Store the product: - in original packaging; - in a way that prevents contact with food, drink or feed, environmental contamination and access by third parties; - at a temperature of 0°C-30°C. Protect against moisture. It is forbidden to use the emptied packaging for other purposes.

FIRST AID
There is no antidote, treat symptomatically. If medical advice is needed, show the packaging or label. IF INHALED: remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor if you feel unwell. IF SWALLOWED: Rinse mouth with water (only if the person is conscious). Get medical attention. IF ON SKIN: Remove contaminated clothing and shoes. Rinse skin with plenty of soap and water. Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Please use product SECOVER safely.
Before each use, read the information on the product label.
Pay attention to the appropriate phrases and warning symbols on the product label.

Non emergencies & technical help phone number: **0800 707 6215**
Medical emergencies, fires & major spills phone number: **01865 407333**

Shelf-life: 4 years

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Appendix 14 – All Results

FLiPPER -1ST SPRAY	
LEAF NUMBER	SCORE
7	2
1	3
2	3
9	3
10	3
3	4
4	4
6	4
8	4
5	5
TOTAL	**35**

FLiPPER - 2ND SPRAY AFTER 10 DAYS 31/07/23	
LEAF NUMBER	SCORE
10	2
1	3
6	3
4	4
8	4
9	4
2	5
3	5
5	5
7	5
TOTAL	**40**

FLiPPER - 3RD SPRAY AFTER 7 DAYS - 07/08/23	
LEAF NUMBER	SCORE
1	1
6	3
2	4
7	4
8	4
3	5
4	5
5	5
9	5
10	5
TOTAL	**41**

MAJESTIK - 1st SPRAY	
LEAF NUMBER	SCORE
1	4
2	2
3	3
4	3
5	4
6	3
7	3
8	2
9	2
10	2
TOTAL	**26**

MAJESTIK - 2ND SPRAY - AFTER 4 DAYS 25/07/23	
LEAF NUMBER	SCORE
1	4
2	4
3	3
4	4
5	3
6	4
7	2
8	2
9	3
10	3
TOTAL	**32**

MAJESTIK - 3RD SPRAY - AFTER 6 DAYS 31/07/23	
LEAF NUMBER	SCORE
1	3
2	2
3	3
4	4
5	3
6	2
7	1
8	5
9	4
10	2
TOTAL	**29**

MAJESTIK - 4TH SPRAY - AFTER 7 DAYS - 07/08/23	
LEAF NUMBER	SCORE
1	4
2	5
3	3
4	4
5	4
6	5
7	5
8	2
9	2
10	2
TOTAL	**36**

PROTAC SF - 21/07/2023	
LEAF NUMBER	SCORE
9	1
1	2
2	2
4	2
5	2
6	2
7	2
8	2
10	2
3	3
TOTAL	**20**

PROTAC SF - 2ND SPRAY AFTER TEN DAYS 31/07/23	
LEAF NUMBER	SCORE
1	1
3	1
2	2
4	2
5	2
6	2
8	2
7	3
9	3
10	3
TOTAL	**21**

PROTAC SF - 3RD SPRAY AFTER 7 DAYS - 07/08/23	
LEAF NUMBER	SCORE
1	4
2	4
3	4
4	4
6	4
8	4
5	5
7	5
9	5
10	5
TOTAL	**44**

SB INVIGORATOR - 21/07/2023	
LEAF NUMBER	SCORE
1	2
2	2
3	2
5	2
6	2
8	2
10	2
7	3
4	4
9	4
TOTAL	**25**

SB INVIGORATOR - 2ND SPRAY - AFTER 4 DAYS 25/07/23	
LEAF NUMBER	SCORE
1	2
6	2
9	2
10	2
2	3
3	3
4	3
5	3
7	3
8	3
TOTAL	**26**

SB INVIGORATOR - 3RD SPRAY AFTER 6 DAYS 31/07/23	
LEAF NUMBER	SCORE
1	2
2	2
3	2
10	2
4	3
5	3
6	3
8	3
9	3
7	4
TOTAL	**27**

SB INVIGORATOR - 4TH SPRAY AFTER 3 DAYS 03/08/23	
LEAF NUMBER	SCORE
1	2
2	3
3	1
4	3
5	2
6	2
7	1
8	3
9	3
10	3
TOTAL	**23**

SECOVER - 21/07/2023	
LEAF NUMBER	SCORE
5	3
9	3
2	4
3	4
4	4
6	4
7	4
8	4
10	4
1	5
TOTAL	**39**

SECOVER - 2ND SPRAY 03/08/23	
LEAF NUMBER	SCORE
10	3
5	4
6	4
9	4
1	4
2	4
8	4
3	5
4	5
7	5
TOTAL	**42**

Appendix 15

SECOVER - 31/07/2 - Np spray applied -A check on pest levels after 7 days	
LEAF NUMBER	SCORE
1	2
3	2
5	2
7	2
8	2
9	2
2	3
6	3
10	3
4	4

TOTAL	**25**