REGISTRATION REPORT

Part B
Section 7: Efficacy Data and Information

Detailed summary of the risk assessment

CLOSER (GF-2626)

120 g/L Sulfoxaflor

All Zones

Zonal Rapporteur Member State: France

(Greenhouse G)

CORE ASSESSMENT

Applicant: DOW AgroSciences

Date: October 2017

Table of Contents

IIIA 6 EFFICACY DATA AND INFORMATION (INCLUDING VALUE DATA) ON THE PLANT PROTECTION PRODUCT

This document was commented by zRMS France. zRMS has also made some correction in the applicant text. At the end of each chapter, a commenting box has been formulated by the zRMS.

Modifications and/or precisions following the comments phase were highlighted in orange by zRMS.

Text in yellow was submitted by the petitioner following the request of zRMS for further summary tables.

GF-2626 contains the active substance sulfoxaflor (120 g/L), a sulfoximine insecticide, which acts as an agonist at the nicotinic acetyl-cholin receptor; death follows ingestion and/or absorption by the target insect pests.

In protected conditions, GF-2626 is intended to control aphids and whiteflies in vegetables (solanaceous and cucurbits) and ornamentals (rose tree, trees and shrubs, outdoor and indoor plants, flowers and bulbs).

An other dRR was submitted concerning crops grown in field. Data provided in the current dRR and in the other one could be considered as complementary.

The table below shows the uses claimed by the applicant and indicates the dose rate and number of applications per use (according to the provided GAP).

Country	**Crops**	**Pests**	**Pest species targeted in trials**	**Maximum application rate (L product/ha)**	**Maximum number of applications per season**
All zones (AT, BE, BG, FR, DE, EL, IE, IT, NL, PT, RO, ES, UK, PL)	Cucurbits (edible peel: cucumber, courgette / zuccini, gherkin AND inedible peel: melon. pumpkin, squash, watermelon)	Aphids	*Aphis gossypii* *Myzus persicae*	0.2 L/ha	2 applications (7 days min interval)
		Whiteflies	*Trialeurodes vaporariorum* *Bemisia tabaci*	0.4 L/ha	1 application
				Or 0.2 L/ha	2 applications (7 days min interval)
All zones (AT, BE, BG, HR, CY, FR, DE, EL, IE, IT, MA, NL, PT, RO, ES, UK, PL)	Tomatoes, Pepper Aubergine	Aphids	*Aphis gossypii* *Myzus persicae*	0.2 L/ha	2 applications (7 days min interval)
		Whiteflies	*Trialeurodes vaporariorum* *Bemisia tabaci*	0.4 L/ha	1 application
				Or 0.2 L/ha	2 applications (7 days min interval)
All zones (AT, BE, BG, FR, DE, EL, IE, IT, NL, PT, ES, UK, PL)	Ornamentals (Flowers and roses, bulbs, trees and shrubs, outdoor and indoor plants)*	Aphids	*Aphis gossypii* *Myzus persicae* *Macrosiphum euphorbiae* *Aphis fabae*	0.2 L/ha	2 applications (7 days min interval)
		Whiteflies	*Trialeurodes vaporariorum* *Bemisia tabaci*	0.4 L/ha	1 application
				Or 0.2 L/ha	2 applications (7 days min interval)

***for France, outdoor and indoor ornamentals plants are not considered as professional use.**

This application is submitted under Regulation (EC) 1107/2009 by Dow AgroSciences to the zonal RMS France in line with Articles 33-39 of mentioned EU regulation. The applicant is asking for approval of this insecticide, code name GF-2626, containing the new active ingredient sulfoxaflor to be used in solanaceous and cucurbit vegetable crops and ornamentals in protected situations in the European Union. The zonal RMS will conduct the evaluation of the dossier.

Sulfoxaflor is a new active substance which is currently undergoing evaluation for active substance approval in the EU. Ireland (Pesticide Registration and Control Division, PRCD) is the Rapporteur Member State (RMS). A dossier for the active substance was submitted by Dow AgroSciences, under Regulation (EC) 1107/2009, to the RMS in July 2011 with an application to obtain its approval in the EU.

The Draft Assessment Report (DAR) on sulfoxaflor was finalised and distributed by Ireland in November 2012, with a recommendation for approval of the active substance according to Regulation (EC) 1107/2009. The EFSA peer review process was conducted and the EFSA conclusion was published in May 2014.

This current submission is for one of the representative formulations, GF-2626 (120 g/L SC). This is the first submission for authorisation of plant protection products containing sulfoxaflor in EU Member States. The proposed zonal RMS for evaluating the uses in protected situations across the European Union is France.

Sulfoxaflor is a new systemic sap-feeding insecticide, discovered by Dow AgroSciences, and the first commercialized member of the sulfoximine chemical family. It is being registered globally on a wide range of crops and is now on sale in the USA, Canada and parts of Asia, Africa and Latin America.

The sulfoximines, as exemplified by sulfoxaflor ([N-[methyloxido[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]-k4-sulfanylidene] cyanamide] represent a new class of insecticides. Sulfoxaflor exhibits a high degree of efficacy against a wide range of sap-feeding insects, including those resistant to neonicotinoids and other insecticides. Sulfoxaflor is an agonist at insect nicotinic acetylcholine receptors (nAChRs) and functions in a manner distinct from other insecticides acting at nAChRs. The sulfoximines also exhibit structure activity relationships (SAR) that are different from other nAChR agonists such as the neonicotinoids (Sparks *et al*., 2013). IRAC assigned nicotinic acetylcholine receptor agonists to Group 4 in their classification system. The neonicotinoids (acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid and thiamethoxam) were assigned to sub group 4A. Nicotine was assigned to sub group 4B and sulfoximines, including sulfoxaflor, were assigned to sub group 4C.

Information on the detailed composition of GF-2626 and physico-chemical properties of sulfoxaflor, reference should be made to Registration Report Part B Section 1: Identity, physical and chemical properties, other information.

The data presented in this dRR fully support the label claims for sulfoxaflor for the control of a wide range of aphid and whitefly species in solanaceous and cucurbit vegetable crops and ornamentals grown in protected situations in the European Union. Proposed uses for this product are supplied in **Appendix 2**.

The detailed assessment of the individual trial and study data is located in the following report: IIIA 6. Biological Assessment Dossier for GF-2626 (sulfoxaflor) Protected Uses in the European Union.

Appendix 1 of this core dRR contains the list of references included in this document for support of the evaluation.

IIIA 6.1 Efficacy data

ZRMS drew the table below to summarize the efficacy data provided. In case of some uses are minor is some MS, the possibility of extrapolation are also mentionned (according to EPPO extrapolation tables). The table below referred only to common uses claimed for both controlled conditions and field.

Crops	**Pests**	**Number of efficacy trials indoor/pest/crop**	**Number of efficacy trials outdoor/pest/crop**	**EPPO extrapolation tables (for minor uses)**
Cucurbits (edible peel: cucumber, Gherkin, zucchini AND inedible peel: watermelon, squash, melon)	Aphids	dRR Greenhouse: 12 Mediterranean (Med) trials against *Aphis gossypii* in cucumber (6 trials), zucchini (4 trials) and watermelon (2 trials). *The same trials were provided for minimum effective dose trials.*	dRR Greenhouse: 4 Med trials were carried out against *Aphis fabae* (1 trial), *Myzus persicae* (2 trials) and *Aphis nasturtii* (1 trial) in melon (2 trials) and zucchini (2 trials) in France (1 trial), Portugal (1 trial) and Spain (2 trials). *Trials provided only for efficacy evaluation in dRR Greenhouse* dRR Field: 24 Med trials were carried out in France 2 trials, in Spain 10 trials, in Italy 10 trials, in Greece 2 trials against *Aphis gossypii* (APHIGO) in cucumber (4 trials), zucchini (9 trials), melon (8 trials) and watermelon (3 trials). 4 Med trials were carried out against *Aphis fabae* (1 trial), *Myzus persicae* (2 trials) and *Aphis nasturtii* (1 trial) in melon (2 trials) and zucchini (2 trials) in France (1 trial), Portugal (1 trial) and Spain (2 trials). *24 trials for the minimum effective dose evaluation. All the 28 trials were provided for efficacy evaluation.*	No need for extrapolation table. Otherwise, this is the appropriate table, if needed: PP 1/257 IEET 37 (2). This table allows extrapolating data from solanaceous to cucurbits, concerning *Myzus persicae*.

	Whiteflies	dRR Greenhouse: 13 trials (12 Med + 1 Mar) against *Trialeurodes vaporariorum* (6 trials) and *Bemisia tabaci* (7 trials) in cucumber (9 trials) and zucchini (4 trials). *The same trials were provided for minimum effective dose trials.*	dRR Field: 12 Med trials were conducted in Italy (8 trials) and Greece (4 trials), and 1 not GEP trial from Cyprus, on zucchini (8) and cucumber (5) against *Trialeurodes vaporariorum* (8) and *Bemisia tabaci* (4).	No need for extrapolation table. Otherwise, this is the appropriate table, if needed: PP 1/257 IEET 72 (1).
Ornamentals (Flowers and roses, bulbs, trees and shrubs, outdoor and indoor plants)	Aphids	dRR Greenhouse: 9 Med trials against *Aphis gossypii* (2 trials), *Myzus persicae* (2 trials), *Macrosiphum euphorbiae* (3 trials), *Aphis fabae* (1 trial) and a mixed population of aphids (APHISP, 1 trial) in *Chrysanthemum* (4 trials), *Calendula officinalis*, *Bellis perennis* (2 trials), *Geranium* spp. and *Nicotiana rustica*. *The same trials were provided for minimum effective dose trials.*	dRR Field: 6 trials, carried out in Belgium (1 trial) and Italy (5 trials). Trial in Belgium was carried out on *Fagus sylvatica*, all trials in Italy on roses. The aphid species were *Phyllaphis fagi* – PHYAFA (1 trial) and *Macrosiphum rosae* – MACSRO (5 trials). *Only 5 Italian trials were presented in the minimum effective dose evaluation.*	The EPPO extrapolation table permits to use data obtained with *Aphis gossypii* and *Myzus persicae* in cucurbits and in solanaceous for the same aphid in ornamentals (PP 1/257 IEET 27 (3)).
	Whiteflies	dRR Greenhouse: 3 Med trials in *Euphorbia*, *Lantana* and *Gerbera* for the control of *Trialeurodes vaporariorum*. *The same trials were provided for minimum effective dose trials.*	dRR Greenhouse: 2 Med trials outdoor for the control of *Trialeurodes vaporariorum* in *Euphorbia pulcerrima*. *The same trials were provided for minimum effective dose trials.* dRR Field: The same 2 outdoor trials.	The EPPO extrapolation table permits to use data obtained with *Bemisia tabaci* in solanaceous or cucurbits for the same whitefly in ornamentals (PP 1/257 IEET 72 (1)).
Pepper Tomatoes	Aphids	dRR Greenhouse: 15 trials (14 MED + 1 SE) in pepper (9 trials), tomato (2 trials) and eggplant (4 trials) against *Aphis gossypii* (10 trials) and *Myzus persicae* (6 trials). One trial had both species evaluated. *The same trials were provided for minimum effective dose trials.*	dRR Field: 12 trials - 2 trials in France (1 Med + 1 Mar), 7 in Italy, 3 in Spain in pepper (1), tomato (7) and eggplant (4) against *Aphis gossypii* (5), *Myzus persicae* (3) and *Macrosiphum euphorbiae* (4). *The same trials were provided for minimum effective dose trials.*	The use of EPPO extrapolation table (PP 1/257 IEET 17 (2)) is considered as not necessary.
	Whiteflies	dRR Greenhouse:	dRR Field: 6 trials on	No need for

Aubergine		22 Med trials against *Trialeurodes vaporariorum* (9 trials) and *Bemisia tabaci* (13 trials) in tomato (12 trials), pepper (5 trials) and eggplant (5 trials). *The same trials were provided for minimum effective dose trials.*	*Bemisia tabaci* and 6 trials on *Trialeurodes vaporariorum* in 2 trials on bell pepper, 9 trials in tomato, 1 trial in eggplant.	extrapolation table. Otherwise, this is the appropriate table, if needed: PP 1/257 IEET 72 (1).

Med = Mediterranean, Mar = Maritime

This draft registration report (dRR) aims to demonstrate that GF-2626 deliver high level of control of aphids and whiteflies on cucurbit and solanaceous vegetable crops and ornamentals grown under greenhouse conditions and comparable to competitor insecticides within the European Union.
Regulation EC 1107/2009 specifies that the assessment of plant protection products should be conducted on a zonal basis. Article 33 of EC 1107/2009 considers that in the case of an application for use in greenhouses, the whole of the EU area is considered as one authorization zone.

Climatic considerations
For the purpose of this dossier, efficacy data are presented from trials that are conducted mainly in one region, the Mediterranean EPPO Climatic zone. The conditions in the Mediterranean EPPO Climatic zone represent the more challenging of the conditions encountered across all zones in which authorisation is sought considering the intended pests.
The more challenging conditions under which the presented trials are carried out, justify the possible use of these trials for the whole of the EU area, especially on minor crops (e.g. ornamentals). However, some cMS may require for further efficacy demonstration, considering that at least a part of the trials should have been carried out in the indoor conditions of the Central zone (the Netherlands, Germany…).

Formulations

The formulation of sulfoxaflor proposed for the use in greenhouses is GF-2626 (120 g a.s./L, SC) but before 2010 another formulation - GF-2032 (240 g a.s./L, SC) – was used exclusively in the trials. The composition of the 2 formulations is very similar as the ingredients are the same, only their concentration is different as GF-2032 is a higher concentrated formulation than GF-2626. The compositions are described in the IIIA1.4.1 section of the submitted Registration Report Part C. In order to create a robust database using all available data from the 2 formulations, a European approach was taken to use both field and protected crop situations for demonstrating the efficacy and comparability of the 2 sulfoxaflor formulations. The efficacy results from the comparability trials showed biological equivalency of GF-2626 (120 g a.s./L, SC) and GF-2032 (240 g a.s./L, SC) at the compared dose rates, which proved also by statistical analysis (Student T test). Therefore, data from both formulations were used for demonstrating the minimum effective dose rate and the efficacy comparability of sulfoxaflor having a larger data set for drawing more reliable conclusions.

Background information on the target crops and pests

CUCURBIT CROPS (cucumbers, zucchini, melons, watermelons) are important crops in the European Union, which produces seven million tonnes of cucurbits on 217,000 hectares including both open field and protected situations.

Vegetable and ornamental crops are damaged by many different pests and **aphids** are among the most important sap feeding insect species, which cause high yield loss every year in greenhouse crops including cucurbits, solanaceous vegetables but also ornamentals. In cucurbit vegetable crops *Aphis gossypii* (cotton aphid) is the most important aphid species but other species such as *Myzus persicae* (green peach aphid), *Aphis fabae* (bean aphid) and *Aphis nasturtii* (buckthorn aphid) are also attacking cucurbits. Direct damage to the crop occurs with heavy infestations leading to direct yield losses. Excretion of honeydew leads to sooty moulds developing on the leaves and fruit causing big losses in the quality. Aphids, in particular *M. persicae* and *A. gossypii* are also virus transmitters, which disease also significantly impacting the yield. *Aphis gossypii* is the major vector of crinkle mosaic, rosette, CTV and other virus diseases impacting cucumber, aubergine, courgette, melon but also other crops.

Whiteflies are also important sap feeding insects on cucurbits causing also high yield loss every year in greenhouse conditions. The most common whitefly species damaging cucurbit crops are *Trialeurodes vaporariorum* (greenhouse whitefly) and *Bemisia tabaci* (sweet potato whitefly). Whiteflies cause serious crop damage through direct feeding but the genus of Bemisia is important also in the transmission of plant diseases. Generally *Bemisia* whiteflies are more difficult to control and be killed than *Trialeurodes*.

SOLANACEOUS CROPS (tomato, pepper and eggplant) are also very important crops in the European Union where eighteen million tonnes fruits are produced on more than 400,000 hectares including a significant production under greenhouse conditions.
In solanaceous vegetables, *Aphis gossypii* and a lesser extent *Myzus persicae* are the most important **aphids**. Other species such as *Aphis fabae* or *Aphis nasturtii* are occasionally also found in the crop. *Myzus persicae* is the most significant vector for the transport of potato virus Y (PVY) and potato leaf roll virus (PLRV) and various mosaic viruses damaging the solanaceous crops like tomato and pepper but also attacks a broad range of other crops and a variety of ornamentals. It has been implicated in the transmission of over 180 plant viruses.

The most common **whitefly** species damaging solanaceous crops are *Trialeurodes vaporariorum* and *Bemisia tabaci*. The adults and especially the larvae release a sweet liquid, the honeydew that makes the leaves and the fruits sticky. Then a black fungus develops on this honeydew which causes the development of sooty moulds, which is a major quality problem in the vegetable and ornamental crops. *B. tabaci* and a lesser extent *T. vaporariorum* transmit viruses (TYLCV, ToCV, TiCV...) to several solanaceous crops. The larvae of B biotype of *B. tabaci (B. argentifolia*) cause physiological disorders on certain plants: silvering of pepper and eggplant as well as irregular maturation of tomato.

ORNAMENTAL PLANTS AND FLOWERS are produced mainly in the Mediterranean (Italy, Spain) and the Maritime (Netherlands, Germany) climatic zones in the European Union. Ornamentals grown under greenhouse conditions are the highest value crops therefore the 22 000 hectares European production area generate billions of dollars value each year.

Ornamentals have many different pests damaging them and **aphids** are probably the most important sap feeding insects, which cause the highest yield loss in general under greenhouse conditions. The most common aphid species are: *Aphis gossypii*, *Myzus persicae, Aphis fabae, Macrosiphum rosae* and *Macrosiphum euphorbiae*. Secondary aphid species are *Myzus ascalonicus, Brachycaudus helichrysi, Aulocorthum solanii* and *Rhodobium porosum*. Very often, mixed populations are present. Probably the most important consequences of aphids attacking ornamental plants is the transmission of virus diseases especially on carnation, chrysanthemum, gladiolus, tulip, lilies, hyacinth, iris, narcissus, daphne, lilac, philodendron and many of the Araceae. Other types of damage are the leaf distortion, gall production, discoloration and the honey dew, which symptoms are destroying the value of ornamentals.

Whiteflies caused losses are also very high, not necessarily by direct feeding damage but because of plant diseases spread mainly by *Bemisia tabaci* and the honey dew production, which cause serious cosmetic problems on the flowers.

IIIA 6.2 Preliminary range-finding tests

Herbicidal activity:

Two preliminary laboratory studies were conducted by Dow AgroSciences Discovery Research and Stockbridge Technology Centre Ltd laboratories to evaluate pre-emergent herbicidal activity of sulfoxaflor across a range of crop and weed species. Sulfoxaflor was applied in various rates up to 4,500 and 96 g a.s./ha respectively. The test species included twelve monocotyledon species (Oats, Maize, Rice, Spring wheat and Onion crops and Ryegrass (*Lolium spp*.), Blackgrass (*Alopecurus myosuroides*), Wild oat (*Avena spp*.), Crabgrass (*Digitaria spp.*), Barnyardgrass (*Echinochloa spp*.), Giant foxtail (*Setaria faberi*), and Johnsongrass (*Sorghum halepense*) weeds) and fifteen dicotyledon species (Soybean, Oilseed rape, Cabbage, Tomato, Lettuce, Carrot, Sugar beet, Cotton, Sunflower and Cucumber crops and Velvetleaf (*Abutilon theophrasti*), Pigweed (*Amaranthus spp.)*, Lambsquarter (*Chenopodium album*), Wild poinsettia (*Euphorbia heterophylla*) and Ivyleaf morningglory (*Ipomoe hederacea*) weeds) representing many important plant families. No effects were observed in the pre-emergence tests at rates less than or equal to 563 g a.s./ha, well in excess of the proposed label rate for sulfoxaflor products, which is maximum 48 g a.s./ha in Europe (Schmitzer and Donely, 2008; Rockcliff, 2011a).

Two preliminary laboratory studies were conducted by Dow AgroSciences Discovery Research and Stockbridge Technology Centre Ltd laboratories to evaluate post-emergent herbicidal activity of sulfoxaflor across a range of crop and weed species. Sulfoxaflor was applied in various rates up to 400 and 96 g a.s./ha respectively. The test species included twelve monocotyledon species (Oats, Maize, Rice, Spring wheat and Onion crops and Ryegrass, Blackgrass, Wild oat, Crabgrass, Barnyardgrass, Giant foxtail, and Johnsongrass weeds) and nineteen dicotyledon species (Soybean, Oilseed rape, Cabbage, Tomato, Lettuce, Carrot, Canola, Sugar beet, Cotton, Sunflower and Cucumber crops and Canada thistle, Velvetleaf, Pigweed, Lambsquarter, Wild poinsettia, Wild buckwheat, Viola and Ivyleaf morningglory weeds) representing many important plant families. No effects were observed in the post-emergence tests at rates less than or equal to 96 g a.s./ha, well in excess of the proposed label rate for sulfoxaflor products, which is maximum 48 g a.s./ha in Europe (Schmitzer and Donely, 2008; Rockcliff, 2011b).
It was concluded, sulfoxaflor does not pose any phytotoxicity risk to crops including succeeding or adjacent crops if applied according to the label recommendations. It is already proved by the practice as several commercial formulations have been tested and sold all around the world and no phytotoxicity was reported on target or succeeding crops.

Fungicidal activity:

The insecticidal compound X11422208 (sulfoxaflor) was evaluated in Dow AgroSciences Fungicide Discovery laboratory in vitro high-throughput screens (HTS) against four fungal species (*Phytophthora infestans, Pyricularia oryzae, Septoria tritici, Ustilago maydis*) representing three fungal phyla (Oomycota, Ascomycota, Basidiomycota) to assess its potential effects on fungi. 5 ppm rate of sulfoxaflor was tested in 96 well polystyrene microtiter plates and its effect was compared to azoxystrobin and tebuconazole rates of 5 and 0.05 ppm. After an incubation period of one to three days depending on the fungus, growth (G) was determined by measurement of light scattering using a nephelometer (Nephelostar Galaxy, BMG Laboratories, Offenburg, Germany) and growth inhibition (%GI) was then calculated.

The observed values of growth inhibition for sulfoxaflor ranged from zero percent for USTIMA to 20 percent for PHYTIN. Percent growth inhibition values of up to 20 percent are common in untreated but inoculated wells in these HTS assays, likely a result of unequal evaporation, especially in wells near edges of the plate. Hence, with background growth inhibition of this level, the values observed for sulfoxaflor do not indicate fungicidal activity against these fungi at the rates tested (Davis, 2013).

In conclusion, as sulfoxaflor did not demonstrate activity on representative fungi from a wide range of genera and taxonomic classes, it is unlikely that sulfoxaflor has any fungicidal activity applied at label rates.

Insecticidal activity:

Sulfoxaflor is a member of a novel class of insecticides, the sulfoximines, which act through a unique interaction with the nicotinic acetylcholine receptor (nAChR) in insects. Early stage screening results of sulfoxaflor were obtained on a wide spectrum of arthropods and use patterns. Sulfoxaflor activity was tested according to different level of Dow AgroSciences early stage insecticide testing protocols against aphids (*Myzus persicae, Aphis gossypii),* whiteflies (*Bemisia tabaci),* plant hoppers (*Nilaparvata lugens, Nephotettix cintceps)*, plant bugs (*Lygus hesperus),* caterpillars (*Spodoptera exigua, Heliothis zea),* beetles (*Leptinotarsus decemlineata*, *Popillia japonica, Diabrotica virgifera virgifera),* flies (*Drosophila melanogaster),* termites (*Reticulitermes flavipes)*, cockroaches *(Blatta germanica),* mites (*Tetranychus urticae)* and nematodes *(Caenorhabditis elegans and Meloidogyne incognita).*

Sulfoxaflor showed very high potency against aphids and also other sap feeding insects such as plant and leafhoppers, *Lygus* bugs as well as whiteflies (*Bemisia tabaci*) were also controlled effectively by sulfoxaflor, its efficacy was comparable to commercial standards. In some tests termites and cockroaches also proved to be susceptible to sulfoxaflor. However, sulfoxaflor showed little activity against pests in the orders *Coleoptera, Lepidoptera, Diptera* as well as the nematodes (Babcock *et al*., 2007).

In several laboratory trials, sulfoxaflor was active on the sap feeding pests by both ingestion and contact activity and demonstrated good systemic activity. Studies demonstrated that, through root uptake, sulfoxaflor redistributed to both foliage present at the time of treatment and new foliage appearing after a pulsed treatment. Speed of action studies, as measured by the reduction in honeydew production showed that sulfoxaflor has very fast feeding cessation effect and probably this effect was measured in some virus transmission trials where significant reduction in virus symptoms was demonstrated in cucurbits and in winter barley.

In 2006, two preliminary field trials were set up on tomato and one on eggplant to evaluate the efficacy of sulfoxaflor against aphids (*Aphis gossypii)* and whitefly (*Trialeurodes vaporariorum)* in solanaceous vegetables and to compare the performance to standard reference products. In one tomato trial there was one application carried out and in another one two applications. Sulfoxaflor was tested at various dose rates up to 100 g a.s./ha.

In the trial carried out on eggplant, no statistical difference was observed between the tested dose rates (6,25- 50 g a.s./ha) of sulfoxaflor against *Aphis gossypii* in any assessment delivering high efficacy being comparable to standards. Similarly high performance was seen against *Trialeurodes vaporariorum* where again no significant difference was observed between the treatments. In the tomato whitefly trials various results were observed but in both trials 50 g a.s./ha rate of sulfoxaflor was at least as good as the standard imidacloprid (50 g a.s./ha).
Based on data from the preliminary laboratory and field trial results it can be concluded that sulfoxaflor at the proposed label rates (24-48 g a.s./ha) has high potency against aphids and whiteflies without significant impact on the nematodes or insects in the orders of *Coleoptera, Lepidoptera, Diptera*.

ZRMS conclusion about preliminary range-finding tests
The laboratory trials showed that the sulfoxaflor had neither no herbicidal activity, nor fungicide activity at the intended dose. Considering the insecticide activity, sulfoxaflor showed little activity against pests in the orders *Coleoptera, Lepidoptera, Diptera* as well as the nematodes. On aphids and whiteflies, the preliminary trials showed that sulfoxaflor had an interesting control at dose rates ranging from 6 to 50 g sulfoxaflor/ha.

IIIA 6.3 Minimum effective dose tests

Sulfoxaflor was tested at several rates between 6 and 72 g a.s/ha in the target crops for the control of the target aphid and whitefly species. The rates reflected the proposed label rate of sulfoxaflor and some lower and higher rates, in accordance with the EPPO standard PP 1/225 'Minimum effective dose'. Efficacy was tested under a range of environmental conditions to fully challenge the product. All trials were conducted by officially recognized testing organizations with the Good Experimental Practices (GEP) and followed the appropriate EPPO standards PP 1/135, PP 1/152, PP 1/181, PP 1/225 and the pest specific guidelines.

Aphid control in cucurbits

Between 2008 and 2010, 12 trials were conducted in Europe to determine the minimum effective dose rate of sulfoxaflor against *Aphis gossypii* (APHIGO) in cucurbit crops grown in protected situations. The trials were set up in Spain (9 trials), Portugal (1 trial), Italy (1 trial) and France (1 trial) in cucumber (6 trials), zucchini (4 trials) and watermelon (2 trials) crops. One application was performed with various rates of sulfoxaflor (6-24 g a.s./ha) at the development stage of BBCH 20-89, depending of the crop and the situation. The water volume used was 490-1,000 L/ha, sprayed with a backpack sprayer. The natural infestation level at application was sufficient (4 – 513 aphids / leaf) to obtain reliable results.
Sulfoxaflor showed a dose response reaching the plateau at 24 g a.s./ha, which rate provided sufficient knockdown (3 DAA) and excellent long lasting (up to 3 weeks) aphid control (**Table 0-1**). The dose response was very clear at knock down activity and during the 1st week but later differences decreased. A reduction of dose rates below 24 g a.s./ha increased the variation in efficacy especially at the early 'knockdown' assessments. Therefore, the minimum effective rate and the recommended dose rate of sulfoxaflor is 24 g a.s./ha against aphids in cucurbits grown in protected situations.

Table 0-1 Efficacy of sulfoxaflor at rates of 6, 12 and 24 g a.s./ha against aphids (APHIGO) in cucurbit crops grown in protected situations.

Days after appl.	Efficacy in %			Comparison between 12 and 24 g sulfoxaflor/ha
	sulfoxaflor			
	6 g a.s./ha	12-12.5 g a.s./ha	24-25 g a.s./ha	

	mean	limits	nr of trials	mean	limits	nr of trials	mean	limits	nr of trials	
1-2	65.8	42-98.6	4	**70.9**	**52.1-97.5**	**4**	**81.2**	***72.7-97.5***	**4**	**/+10 points**
3	84.4	*54.4-100*	5	**93.5**	***82-100***	**5**	**94.2**	***84.1- 100***	**5**	**0 point** (the variability was less marked)
7-9	96	*79.8 - 100*	8	**98.3**	***91-100***	**8**	**99.8**	***99-100***	**8**	**/+2 points**
13-14	96.9	*90.1-100*	9	**99.2**	***97.5-100***	**9**	**99.4**	***96.9-100***	**9**	**0 point**
20-21	93.6	*76.2-99.9*	7	**97.2**	***87.6-100***	**7**	**96.6**	***92.7-100***	**7**	**0 point** (the variability was less marked)

Performance of sulfoxaflor in comparison to the reference acetamiprid against aphids (APHIGO – *Aphis gossypii*) in cucurbits (protected crops) at assessments 13-14 DAA

Trials	Days after the application	Pests nr/unit at appl'n	Efficacy (% control Tukey mean comparison)		Acetamiprid g a.s./ha	Comparision between 12 and /24 g sulfoxaflor/ha
			Sulfoxaflor g a.s./ha			
			12-12.5	24-25	60-75	
~~T1~~	~~14~~	~~20-61 aphids/50 leaves~~	~~98.8 ab~~	~~100 a~~	~~96.1 ab~~	Not valid (too low infestation)
T2	14	108 aphids/leaf	100 a	100 a	99.9 a	=
T3	14	36.9-63.3 aphids/leaf	100 a	100 a		=
T4	13	29-81 aphids/leaf	97.5 a	96.9 d	97.4 b	>
T5	14	2.2-5 aphids/leaf	99.6 d	99.8 c	99.9 b	<
T6	14	68-118 aphids/leaf	99.9 b	100 a	99.6 d	<
T7	14	28.9 aphids/leaf	99.9 c	99.8 d	99.6 e	>
T8	14	4-8.6 aphids/leaf	97.7 f	98.2 b	98.2 d	<
T9	14	952.75 aphids/leaf	99.8 c	100 a	98.8 e	<
General mean			99.2	99.4	98.7	
Min - Max			91.5 - 100	82.7 - 100	89.5 - 100	
Number of trials			9	9	8	

ZRMS conclusion: Aphids control in cucurbits

Between 2008 and 2010, 12 Mediterranean trials were conducted in Spain (9 trials), Portugal (1 trial), Italy (1 trial) and France (1 trial) in cucumber (6 trials), zucchini (4 trials) and watermelon (2 trials) crops grown in protected situations against *Aphis gossypii* (APHIGO).

The results get on zucchini, melon, cucumber and watermelon crops against Aphis gossypii (APHIGO) showed globally that the difference of efficacy levels between 12 g sulfoxaflor/ha (0.5N) and 24 g sulfoxaflor/ha (N) is low. However, 24 g sulfoxaflor/ha (N) was statistically better than the half dose (12 g sulfoxaflor/ha) in 5 trials out of 10 (at the assessment 13-14 DAA).

For information, under field conditions, the same tendency is seen (on same pest and same crops).

Consequently, zRMS concludes that 24 g/ha is the effective dose for the control of *Aphis gossypii* in cucurbits grown in greenhouse. A dose range of 12-24 g/ha is judged appropriate.

At the commenting stage, some cMS (NL, ES…) commented that the minimum effective dose on aphids (cucurbits, solanaceous and ornamentals) can be reduced from 24 to 12 g a.s./ha, considering the low difference of efficacy seen between these 2 rates (0.5 N and N).

Aphid control in solanaceous vegetable crops

Between 2008 and 2010, 16 trials were conducted in Europe to determine the minimum effective dose rate of sulfoxaflor against *Aphis gossypii* (APHIGO) and *Myzus persicae* (MYZUPE) in solanaceous vegetable crops grown in protected situations. The trials were set up in Spain (8 trials), Greece (1 trial), Italy (6 trials) and Hungary (1 trial) in pepper (10 trials), eggplant (4 trials) and tomato (2 trials) crops. One application was performed with various rates of sulfoxaflor (6-24 g a.s./ha) at the crop development stage of BBCH 29-89. The natural infestation level at application was sufficient (0.4 – 4.62 aphids / leaf) to obtain reliable results.
Sulfoxaflor showed a dose response reaching the plateau at 24 g a.s./ha on both tested species, which rate provided sufficient knockdown and excellent long lasting aphid control (

Table 0-2). There was no significant difference between the sensitivity of MYZUPE and APHIGO to sulfoxaflor, the

Pest species	Days after appl.	Efficacy in %									Comparision between 12 and 24 g sulfoxaflor /ha
		SULFOXAFLOR									
		6 g a.s./ha			12-12.5 g a.s./ha			24-25 g a.s./ha			
		Mean	*Limits*	nr of trials	Mean	*Limits*	nr of trials	Mean	*Limits*	nr of trials	
APHIGO	2-3	90.4	*51.9-99.2*	9	89.4	*63,1-100,0*	9	93.2	*76.8-100.0*	9	
	6-8	89.4	*69.4-98.7*	9	92.4	*75.0-100.0*	9	94.5	*75.0-100.0*	9	
	13-15	88.4	*77.8-99.6*	8	95.0	*86.8-100.0*	8	98.0	*93.1-100.0*	8	/+ 3 points
	20-22	84.2	*67.9-100.0*	8	91.2	*82.9-100.0*	8	97.1	*92.1-100.0*	8	/+ 6 points
MYZUPE	2-3	87.1	*59,8-100,0*	6	95.2	*89,1-100,0*	6	97.4	*92,3-100,0*	6	
	6-8	98.0	*95.65-100*	6	99.4	*99.7-100.0*	6	99.9	*99.7-100.0*	6	
	13-15	95.3	*79.2-100.0*	6	99.2	*99.1-100.0*	6	99.1	*95.7-100.0*	6	0 point
	20-22	95.0	*87.4-100.0*	3	97.9	*95.2-100.0*	3	99.5	*98.5-100.0*	3	/ +2 points
TOTAL DATA	2-3	85.1	*51,9-100,0*	15	91.7	*63,1-100,0*	15	94.9	*76,8-100,0*	15	
	6-8	92.8	*69,4-100,0*	15	95.2	*75,0-100,0*	15	96.7	*75,0-100,0*	15	
	13-15	91.3	*77.8-100.0*	14	96.8	*86.8-100.0*	14	98.5	*93.1-100.0*	14	/+ 2 points
	20-22	87.1	*67.9-100.0*	11	93.0	*82.9-100.0*	11	97.7	*92.1-100.0*	11	/+ 5 points

dose response was very clear at knock down and the long lasting activity but was observable during the whole evaluation period. A reduction of dose rates below 24 g a.s./ha increased the variation in efficacy especially at the early assessments. Therefore, the minimum effective rate and the recommended dose rate of sulfoxaflor is 24 g a.s./ha against aphids in solanaceous vegetable crops grown in protected situations.

Table 0-2 Efficacy of sulfoxaflor at rates of 6, 12 and 24 g a.s./ha against aphids in solanaceous vegetable crops grown in protected situations.

Pest species	Days after appl.	Efficacy in % SULFOXAFLOR 6 g a.s./ha Mean	*Limits*	nr of trials	12-12.5 g a.s./ha Mean	*Limits*	nr of trials	24-25 g a.s./ha Mean	*Limits*	nr of trials	Comparision between 12 and 24 g sulfoxaflor /ha
APHIGO	2-3	90.4	*51.9-99.2*	9	89.4	*63,1-100,0*	9	93.2	*76.8-100.0*	9	
	6-8	89.4	*69.4-98.7*	9	92.4	*75.0-100.0*	9	94.5	*75.0-100.0*	9	
	13-15	88.4	*77.8-99.6*	8	95.0	*86.8-100.0*	8	98.0	*93.1-100.0*	8	/+ 3 points
	20-22	84.2	*67.9-100.0*	8	91.2	*82.9-100.0*	8	97.1	*92.1-100.0*	8	/+ 6 points
MYZUPE	2-3	87.1	*59,8-100,0*	6	95.2	*89,1-100,0*	6	97.4	*92,3-100,0*	6	
	6-8	98.0	*95.65-100*	6	99.4	*99.7-100.0*	6	99.9	*99.7-100.0*	6	
	13-15	95.3	*79.2-100.0*	6	99.2	*99.1-100.0*	6	99.1	*95.7-100.0*	6	0 point
	20-22	95.0	*87.4-100.0*	3	97.9	*95.2-100.0*	3	99.5	*98.5-100.0*	3	/ +2 points
TOTAL DATA	2-3	85.1	*51,9-100,0*	15	91.7	*63,1-100,0*	15	94.9	*76,8-100,0*	15	
	6-8	92.8	*69,4-100,0*	15	95.2	*75,0-100,0*	15	96.7	*75,0-100,0*	15	
	13-15	91.3	*77.8-100.0*	14	96.8	*86.8-100.0*	14	98.5	*93.1-100.0*	14	/+ 2 points
	20-22	87.1	*67.9-100.0*	11	93.0	*82.9-100.0*	11	97.7	*92.1-100.0*	11	/+ 5 points

Summary of detailed data on sulfoxaflor efficacy trials against aphids in solanaceous vegetable crops grown under protected envinronment (13-15 DAA)

Test report	Pest species	Days after appl.	sample size per plot	nr. of aphids in untreated	Efficacy in %, *Student-Newman-Keuls* SULFOXAFLOR 6 g a.s./ ha	12 g a.s./ ha	24 g a.s. /ha
T1	APHIGO	15	45 leaves	10.3/leaf	99.6 *a*	100.0 *a*	100.0 *a*
T6	APHIGO	14	20 shoots	26.6/shoot	80.9 *d*	86.8 *c*	93.1 *b*
T7	APHIGO	14	20 shoots	41.6/shoot	91.0 c	91.6 c	96.3 a
T8	MYZUPE	14	20 leaves	5.1/leaf	79.20 a	96.69 a	95.66 a
T9	APHIGO	14	25 leaves	16.1/leaf	87.0 *2.1 b*	98.6 *0.2 b*	99.5 *0.1 b*
T10	APHIGO	17	25 leaves	16.6/leaf	81.7 *3.0 c*	90.8 *1.5 d*	97.4 *0.4 e*
T11	MYZUPE	15	10 plants	38.9/plant	100.0 *a*	100.0 *a*	100.0 *a*
T13	MYZUPE	14	70 leaves	2.3/leaf	99.2 *a*	99.5 *a*	99.7 *a*

ZRMS conclusion: Aphids control in solanaceous crops

Between 2008 and 2010, 16 trials (15 Mediterranean + 1 South-East) were conducted in Europe to determine the minimum effective dose rate of sulfoxaflor against *Aphis gossypii* (APHIGO) and *Myzus persicae* (MYZUPE) in solanaceous vegetable crops grown in protected situations. The trials were set up in Spain (8 trials), Greece (1 trial), Italy (6 trials) and Hungary (1 trial) in pepper (10 trials), eggplant (4 trials) and tomato (2 trials) crops.

The results get on pepper, tomato and eggplant against *Aphis gossypii* (APHIGO) and *Myzus persicae* (MYZUPE) showed that globally the difference of efficacy between 12 g/ha (0.5N) and 24 g/ha (N) is low. However, 24 g/ha (N) was statistically better than the half dose (12 g as/ha) in 3 trials out of 5 on *Aphis gossypii* (at the assessment 14-17 DAA). The same tendency is seen in field trials (on same pest and same crops).
For *Myzus persicae*, the efficacy of both rates was very good, and therefore no difference is seen between 12 g/ha and 24 g/ha (based on 3 trials; 14-15 DAA). The same tendency is seen in field trials (on same pest and same crops).

Consequently, zRMS concludes that 24 g/ha is the minimum effective dose for the control of *Aphis gossypii* (APHIGO) in solanaceous crops grown in greenhouse. Based on efficacy data on solanaceous and other crops attacked by *Myzus persicae*, 12 g/ha seem sufficient for the control of *Myzus persicae* (MYZUPE) in solanaceous crops grown in greenhouse. A dose range of 12-24 g/ha is judged appropriate.

At the commenting stage, some cMS (NL, ES…) commented that the minimum effective dose on aphids (cucurbits, solanaceous and ornamentals) can be reduced from 24 to 12 g a.s./ha, considering the low difference of efficacy seen between these 2 rates (0.5 N and N).

Aphid control in ornamental crops

Between 2008 and 2012, 9 trials were conducted in Italy to determine the minimum effective dose rate of sulfoxaflor against *Aphis gossypii* - APHIGO (2 trials), *Myzus persicae* – MYZUPE (2 trials), *Macrosiphum euphorbiae* – MACSEU (3 trials), *Aphis fabae* – APHIFA (1 trial) and a mixed population of aphids – APHISP (1 trial). Sulfoxaflor was tested at dose rates from 6 to 48 g a.s./ha in *Chrysanthemum*, *Calendula officinalis*, *Bellis perennis*, *Geranium* and *Nicotiana rustica* species. One application was performed with various rates of sulfoxaflor at the crop development stage of BBCH 59-65. The natural infestation level at application was sufficient (2-132 aphids/plant) to obtain reliable results.

Sulfoxaflor showed a dose response reaching the plateau at 24 g a.s./ha, which rate provided sufficient knockdown and excellent long lasting aphid control on each species (
Table 0-3). The dose response was very clear at knock down and the long lasting activity but was observable during the whole evaluation period. There was no significant difference between the sensitivity of the species in the individual trials. A reduction of dose rates below 24 g a.s./ha always increased the variation in efficacy especially at the early assessments but the dose increase did not improve the performance further. Therefore, the minimum effective rate and the recommended dose rate of sulfoxaflor is 24 g a.s./ha against aphids in ornamental crops grown in protected situations.

Table 0-3 Efficacy of sulfoxaflor at rates of 6, 12, 18, 24 and 48 g a.s./ha against aphids (all species) in ornamental crops grown in protected situations.

Days after appl.		Efficacy of sulfoxaflor in % and mean comparison		
		6 g a.s./ha	18 g a.s./ha	24 g a.s./ha
1-3DAA1	nr of trials	8	8	8
	mean	79.4	90.8	93.0
	min-max trial means	*12.9-100*	*56.9-100*	*67.1-100*
7DAA1	nr of trials	8	8	8
	mean	89.6	93.3	98.2
	min-max trial means	*57.4-100*	*62.4-100*	*93.3-100*
14DAA1	nr of trials	8	8	8
	mean	93.4	97.6	98.4

	min-max trial means	*61-100*	*84.8-100*	*91-4-100*
20-28DAA1	nr of trials	4	4	4
	mean	86	94.5	96.7
	min-max trial means	*61-100*	*84.8-100*	*91.4-100*

Efficacy comparison of sulfoxaflor sprayed at different rates to commercial standards against aphids in ornamental crops grown under greenhouse conditions (14 DAA)

Trial number	Assessment (days after the application)	Pest code	Untreated pest level at evaluation	Efficacy treatments (Henderson-Tilton & Abbot) in %, Tukey's mean comparison (P: 5%)				
				sulfoxaflor				
				6 g a.s./ha	12 g a.s./ha	18 g a.s./ha	24 g a.s./ha	48 g a.s./ha
T1	14DAA1	MYZUPE	12.6 mobile forms/shoot	81.7 b	99.3 a	na	99.4 a	na
~~T2~~ (Not valid because of the low level of infestation)	~~14DAA1~~	~~MYZUPE~~	~~2.7 mobile forms/shoot~~	~~98.3 b~~	~~99.0 ab~~	~~98.6 ab~~	~~99.2 ab~~	~~na~~
T3	14DAA1	MACSEU	16.0 mobile forms/shoot	92.8 bc	92.1 c	97.1 abc	97.7 abc	na
~~T4~~ (Not valid because of the low level of infestation)	~~14DAA1~~	~~APHIGO~~	~~3.7 mobile forms/shoot~~	~~99.2 c~~	~~99.7 b~~	~~100.0 a~~	~~100.0 a~~	~~na~~
~~T5~~ (Not valid because of the low level of infestation)	~~14DAA1~~	~~APHISP~~	~~1.9 mobile forms/shoot~~	~~100.0 a~~	~~100.0 a~~	~~100.0 a~~	~~100.0 a~~	~~na~~
~~T6~~ (Not valid because of the low level of infestation)	~~14DAA1~~	~~MACSEU~~	~~0.3 mobile forms/shoot~~	~~97.8 a~~	~~na~~	~~100.0 a~~	~~98.7 a~~	~~100.0 a~~
T7	14DAA1	APHIGO	57.1 adults/shoot	100.0 a	na	100.0 a	100.0 a	100.0 a
T8	14DAA1	MACSEU	20.1 mobile forms/plant	98.1 a	na	100.0 a	100.0 a	100.0 a
T9	14DAA1	APHIFA	46.7 mobile forms/shoot	61.0 ab	na	84.8 ab	91.4 a	91.4 a

ZRMS conclusion: Aphids control in ornamentals crops

Between 2008 and 2012, 9 trials were conducted in Italy to determine the minimum effective dose rate of sulfoxaflor against *Aphis gossypii* - APHIGO (2 trials), *Myzus persicae* – MYZUPE (2 trials), *Macrosiphum euphorbiae* – MACSEU (3 trials), *Aphis fabae* – APHIFA (1 trial) and a mixed population of aphids – APHISP (1 trial). Sulfoxaflor was tested at dose rates from 6 to 48 g a.s./ha in *Chrysanthemum*, *Calendula officinalis*, *Bellis perennis*, *Geranium* and *Nicotiana rustica* species.

The results get on *Aphis gossypii* (APHIGO), *Myzus persicae* (MYZUPE), *Macrosiphum euphorbiae* (MACSEU) and *Aphis fabae* (APHIFA) in *Chrysanthemum*, *Calendula officinalis*, *Bellis perennis*, *Geranium* and *Nicotiana rustica* species showed that globally the difference of efficacy between 12 g/ha (0.5N), 18 g/ha (0,75N) and 24 g/ha (N) is low.
Considering all minimum effectice dose trials in greenhouse on cucurbits, solanaceous and ornamentals, it can be concluded that the dose of 24 g/ha is appropriate for the control of *Aphis gossypii* (APHIGO), whereas the dose of 12 g/ha seem sufficient for *Myzus persicae* (MYZUPE). On *Aphis fabae* (APHIFA) (1 trial in ornamentals), a trend is seen between 18 and 24 g/ha, suggesting a dose effect in favour of the intended odse of 24 g/ha. On *Macrosiphum euphorbiae* (MACSEU), a trend of dose effect is seen between 12 and 18 g/ha.
The same tendency is seen in field trials (on same pest and similar crops).

Consequently, zRMS concluded that 24 g sulfoxaflor/ha is the effective dose for the control of aphids in ornamentals crops grown in protected conditions. A dose range of 12-24 g/ha is judged appropriate.

At the commenting stage, some cMS (NL, ES…) commented that the effective dose on aphids (cucurbits, solanaceous and ornamentals) can be reduced from 24 to 12 g a.s./ha, considering the low difference of efficacy seen between these 2 rates (0.5 N and N).

Whitefly control in cucurbits

Between 2008 and 2013, 13 trials were conducted in Europe to determine the minimum effective dose rate of sulfoxaflor against *Trialeurodes vaporariorum* (TRIAVA) and *Bemisia tabaci* (BEMITA) whiteflies in cucurbit crops grown in protected situations. The trials were set up in Spain (8 trials), Italy (3 trials), Greece (1 trial) and the United Kingdom (1 trial) in cucumber (9 trials) and zucchini (4 trials) crops. One or two application was performed with various rates of sulfoxaflor (12-75 g a.s./ha) at the development stage of BBCH 12-86, depending on the crop and the situation. The natural infestation level at application was sufficient (4 – 513 whiteflies / leaf) to obtain reliable results.

Days after appl.		**Efficacy of sulfoxaflor in % and mean comparison**			
		24 g a.s./ha	48 g a.s./ha	60 g a.s./ha	75 g a.s./ha
3DAA1	nr of trials	1	1	1	1
	mean	77.2	61.8	64.5	71.5
	limits	77.2	61.8	64.5	71.5
14DAA1	nr of trials	1	1	1	1
	mean	58.9	71.6	77.2	80.3
	limits	58.9	71.6	77.2	80.3
7DAA2	nr of trials	1	1	1	1
	mean	84.2	94.4	96.3	98.7
	limits	84.2	94.4	96.3	98.7
21DAA2	nr of trials	1	1	1	1
	mean	88	100	97.3	100
	limits	88	100	97.3	100
1-4DAA1	nr of trials	3	3	na	na
	mean	68.1	61.3	na	na
	limits	59.5-77.2	59.6-84.1	na	na
5-9DAA1	nr of trials	2	2	na	na
	mean	76.2	88.8	na	na
	limits	64.8-87.5	82.5-95	na	na
13-15DAA1	nr of trials	1	1	na	na
	mean	58.9	71.6	na	na
	limits	58.9	71.6	na	na

Table 0-4 shows single trial results at the upper part to demonstrate the dose response on TRIAVA looking at higher rates as well. The lower part of the table shows a summary across 3 other trials to show the efficacy of a single application of the 24 and 48 g a.s./ha rates.

Table 0-5 shows a summary of 2 trials at the upper part to demonstrate the dose response on BEMITA looking at higher rates. The lower part of the table shows a summary across 3 other trials to show the efficacy of the 24 and 48 g a.s./ha rates. Both table show sulfoxaflor delivered higher efficacy at the higher rates with no significant differences between the top rates.

One application of sulfoxaflor applied at 24 g a.s./ha rate provided sufficient whitefly control in the first week against TRIAVA but later the efficacy decreased significantly. After a second application the efficacy increased again and provided a long lasting protection up to 3 weeks after the second application similar to the higher rates. On BEMITA, the tendency was similar but the efficacy was lower even after a second application. In general, sulfoxaflor applied once at 48 g a.s./ha rate or applied two times at 24 g a.s./ha provided sufficient overall control against TRIAVA and variable control of BEMITA. As whitefly species often occur in mixed populations and the maximum registerable rate of sulfoxaflor is 48 g a.s./ha in the European Union, we recommend the minimum effective dose rate of sulfoxaflor is one single application of 48 g a.s./ha (400 mL/ha), which can be split to two applications of 24 g a.s./ha (200 mL/ha) with 7-14 days spray interval against whiteflies in cucurbit crops grown in protected situations. These rates always proved to be comparable to commercial standards.

Table 0-4 Efficacy of sulfoxaflor at rates of 24, 48, 60 and 75 g a.s./ha dose rates against *Trialeurodes vaporariorum* in cucurbits grown in protected situations.

Days after appl.		**Efficacy of sulfoxaflor in % and mean comparison**			
		24 g a.s./ha	48 g a.s./ha	60 g a.s./ha	75 g a.s./ha
3DAA1	nr of trials	1	1	1	1
	mean	77.2	61.8	64.5	71.5
	limits	77.2	61.8	64.5	71.5
14DAA1	nr of trials	1	1	1	1
	mean	58.9	71.6	77.2	80.3
	limits	58.9	71.6	77.2	80.3
7DAA2	nr of trials	1	1	1	1
	mean	84.2	94.4	96.3	98.7
	limits	84.2	94.4	96.3	98.7
21DAA2	nr of trials	1	1	1	1
	mean	88	100	97.3	100
	limits	88	100	97.3	100
1-4DAA1	nr of trials	3	3	na	na
	mean	68.1	61.3	na	na
	limits	59.5-77.2	59.6-84.1	na	na
5-9DAA1	nr of trials	2	2	na	na
	mean	76.2	88.8	na	na
	limits	64.8-87.5	82.5-95	na	na
13-15DAA1	nr of trials	1	1	na	na
	mean	58.9	71.6	na	na
	limits	58.9	71.6	na	na

Table 0-5 Efficacy of sulfoxaflor at rates of 24, 48, 60 and 75 g a.s./ha dose rates against *Bemisia tabaci* in cucurbits grown in protected situations.

Days after appl.		**Efficacy of sulfoxaflor in % and mean comparison**			
		24 g a.s./ha	**48 g a.s./ha**	**60 g a.s./ha**	**75 g a.s./ha**
13-14DAA2	nr of trials	na	2	2	2
	mean	na	80.1	89.6	88.8
	mean limits	na	62.5-97.8	82.9-96.4	79.7-97.8
20DAA2	nr of trials	na	2	2	2
	mean	na	71.4	82	86.6
	mean limits	na	48.4-94.3	79.7-84.3	76.5-96.7
5-9DAA1	nr of trials	3	3	na	na
	mean	65	70.8	na	na
	mean limits	58.1-71.9	68.4-74.4	na	na
5-9DAA2	nr of trials	3	3*	na	na
	mean	71.8	77.1	na	na
	mean limits	56.5-91.5	63.5-93.6	na	na
13-15DAA2	nr of trials	2	2*	na	na
	mean	63.5	85.8	na	na
	mean limits	46.6-80.3	77.9-93.8	na	na

na = not available; DAA1 = days after application no. 1. All rates were applied one time only. DAA2 = days after application no. 2. All rates were applied two times. *=only 1 application of the 48 g a.s./ha was considered

ZRMS conclusion: Whiteflies control in cucurbits

Between 2008 and 2013, 13 trials were conducted in Europe to determine the minimum effective dose rate of sulfoxaflor against *Trialeurodes vaporariorum* (TRIAVA) and *Bemisia tabaci* (BEMITA) in cucurbit crops grown in protected situations. The trials were set up in Spain (8 trials), Italy (3 trials), Greece (1 trial) and the United Kingdom (1 trial) in cucumber (9 trials) and zucchini (4 trials) crops.

Either for *Trialeurodes vaporariorum* (TRIAVA) or for *Bemisia tabaci* (BEMITA), the results obtained against the both of these pests in cucumber and zucchini showed that the claimed dose rate of 48 g sulfoxaflor/ha can be considered as the minimum effective dose against whiteflies in cucurbits crops grown in protected conditions.

Whitefly control in solanaceous vegetable crops

Between 2007 and 2012, 13 trials on *Bemisia tabaci* (BEMITA) and 9 trials on *Trialeurodes vaporariorum* (TRIAVA) were conducted to determine the minimum effective dose rate for sulfoxaflor for the control of whiteflies in solanaceous crops (tomato-13 trials, pepper 5 trials, eggplant 5 trials) cultivated in protected environment. Trials from Italy (12 trials), Greece (4 trials) and Spain (6 trials) was used where sulfoxaflor was tested at various dose rates from 12 to 75 g a.s./ha. The natural infestation level at application was sufficient (1 to 691 aphids / leaf) to obtain reliable results. One or two applications with 7 to 14 days interval were carried out at development stages between BBCH 13 and 48.

Sulfoxaflor provided variable results, being slightly better against BEMITA than TRIAVA and showed a dose response against both species. Not all rates were tested in all trials but the individual trial results showed a clear - higher the rate, higher the efficacy tendency. The dose rate of 48 g a.s./ha delivered sufficient “knock down” effect on both adults and larvae and provided close to a month residual effect. The 24 g a.s./ha provided sufficient efficacy on the adults but was weaker on larvae. After a second application (7-14 days later) the efficacy increased again and provided a long lasting protection up to 2 weeks after the second application being similar to the 48 g a.s./ha rate and also to the standard treatments (
Table 0-7,
Table 0-6) . Considering that the maximum registerable rate of sulfoxaflor is 48 g a.s./ha in the European Union and several times mixed whitefly populations occur in the greenhouses, 2 applications of 24 g a.s./ha (with 7-14 days interval) or 1 application at 48 g a.s./ha are claimed as the minimum effective rates as well as the recommended label rates for sulfoxaflor against whiteflies in solanaceous vegetable crops cultivated in protected environment.

Table 0-6 Efficacy of sulfoxaflor at 24 and 48 g a.s./ha rates in comparison to reference product against *Trialeurodes vaporariorum* in solanaceous crops grown in protected conditions.

Days after appl.		Efficacy in % and mean comparison		
		Sulfoxaflor at 24 g a.s./ha		Sulfoxaflor at 48 g a.s./ha
		1 spray	2 sprays	1 spray
1-3 DAA1	nr of trials	4	n.a.	4
	mean	**65.3**	n.a.	**65.5**
	limits	*45.4-91.1*	n.a.	*37.2-95*
7 DAA1	nr of trials	4	n.a.	4
	mean	**62.8**	n.a.	**72.2**
	limits	*37.4-89*	n.a.	*51.7-88.3*
14 DAA1	nr of trials	3	n.a.	3
	mean	**67.1**	n.a.	**69.8**
	limits	*52-83.2*	n.a.	*56.8-86.5*
3-7 DAA2	nr of trials	n.a.	3	3
	mean	n.a.	**77**	**68.4**
	limits	n.a.	*66.1-92.1*	*56.8-75.7*
14 DAA2	nr of trials	n.a.	3	3
	mean	n.a.	**74.7**	**68**
	limits	n.a.	*64.5-91.9*	*56-79.4*

n.a. = not available value for this data point; DAA1 = days after application no. 1. All rates were applied one time only; DAA2 = days after application no. 2

Table 0-7 Efficacy of sulfoxaflor at 24 and 48 g a.s./ha rates in comparison to reference product against *Bemisia tabaci* in solanaceous vegetable crops grown in protected situations.

Days after appl.		Efficacy in % and mean comparison		
		Sulfoxaflor at 24 g a.s./ha		Sulfoxaflor at 48 g a.s./ha
		1 sprays	2 sprays	1 spray
1-3 DAA1	nr of trials	3	n.a.	3
	mean	**74.8**	**n.a.**	**76.8**
	limits	*52-86.8*	n.a.	*53.8-88.5*
7 DAA1	nr of trials	3	n.a.	3
	mean	**77.8**	n.a.	**84.5**
	limits	*68.6-89*	**n.a.**	*73.9-93.1*
14 DAA1	nr of trials	3	n.a.	3
	mean	**77.5**	**n.a.**	**85.7**
	limits	*65.7-88.7*	n.a.	*81-88.5*
7 DAA2	nr of trials	n.a.	2	2
	mean	**n.a.**	**77.9**	**81.9**
	limits	n.a.	*62.1-93.8*	*71.3-92.6*
14 DAA2	nr of trials	n.a.	2	2
	mean	**n.a.**	**61.4**	**72.6**
	limits	n.a.	*61.2-61.6*	*70.6-74.6.*

n.a. = not available value for this data point; DAA1 = days after application no. 1. All rates were applied one time only; DAA2 = days after application no. 2

ZRMS conclusion: Whiteflies control in solanaceous crops

Between 2007 and 2012, 13 trials on *Bemisia tabaci* (BEMITA) and 9 trials on *Trialeurodes vaporariorum* (TRIAVA) were conducted to determine the minimum effective dose rate for sulfoxaflor for the control of whiteflies in solanaceous crops (tomato-13 trials, pepper 5 trials, eggplant 5 trials) cultivated in protected environment. Trials from Italy (12 trials), Greece (4 trials) and Spain (6 trials) were used where different dose rates were compared between each other.

For *Trialeurodes vaporariorum* (TRIAVA) on solanaceous (3 trials), no strong difference was seen between 24 and 48 g/ha (67% for 24 g/ha versus 70% for 48 g/ha). However, when considering all trials on *Trialeurodes vaporariorum* on cucurbits and ornamentals, 48 g/ha can be accepted also for the control on this pest on solanaceaous crops (to be decided at MS level, if this dose extrapolation is accepted or not).
For *Bemisia tabaci* (BEMITA) on solanaceous, a marked dose effect is seen between 24 and 48 g/ha (78% for 24 g/ha and 86% for 48 g/ha, 13-15 DAA1).

The results obtained against *Trialeurodes vaporariorum* (TRIAVA) and *Bemisia tabaci* (BEMITA) in tomato, eggplant and pepper showed that the claimed dose rate of 48 g sulfoxaflor/ha can be considered as the minimum effective dose rate against whiteflies in solanaceous crops grown in protected conditions.

Whitefly control in ornamental crops

In 2008-2013, 5 trials (2 open field and 3 greenhouse trials) have been conducted to determine the minimum effective dose rate of sulfoxaflor against whiteflies in ornamental crops. All trials have been carried out in Italy, where sulfoxaflor was tested at various dose rates between 12 and 48 g a.s./ha in *Euphorbia, Lantana* and *Gerbera* crops for the control of *Trialeurodes vaporariorum (*TRIAVA). All 5 trials had a sufficient level (0.5-12.7 mobile forms/leaf) of natural infestation to obtain reliable results. One or two applications were carried out at development stages between BBCH 33 and 64 in open fields and between BBCH 19 and 67 (BBCH code) in greenhouses.
Sulfoxaflor showed a dose response against TRIAVA (

Table 0-8) and the efficacy reached a plateau at 48 g a.s./ha rate delivering sufficient efficacy especially in the first 2 weeks. The efficacy of 24 g a.s./ha rate started decreasing after the second week but after a second spray 2 weeks after the first application with the 24 g as/ha rate, the efficacy increased again and became even better than the residual efficacy of the 1x48 g a.s./ha sulfoxaflor treatment. As both of these treatments delivered sufficient level of control, comparable to the applied standards, the proposed registration rates (minimum effective rate) are 2 applications of 24 g as/ha sprayed with a 7-14 days interval or 1 application of 48 g a.s./ha against whiteflies in ornamental crops grown in protected situations.

Table 0-8 Efficacy of sulfoxaflor at 24 and 48 g a.s./ha dose rates against *Trialeurodes vaporariorum* in protected flowers.

Days after appl.		Sulfoxaflor	
		24 g a.s./ha	48 g a.s./ha
		1 spray	1 spray
1-3DAA1	nr of trials	2	2
	mean	64.2	82.2
	min-max means	*54.1-74.2*	*81.6-82.8*
7DAA1	nr of trials	2	2
	mean	73.9	88.0
	min-max means	*64-83.8*	*82.7-93.4*
14DAA1	nr of trials	1	1
	mean	81.8	91.1
	min-max means	*81.8*	*91.1*

DAA1 = days after application no. 1; DAA2 = days after application no. 2; (*) = 1 single spray; (**) = 2 sprays.

Efficacy of sulfoxaflor at proposed label rates in comparison to reference products against adults of TRIAVA in flowers in ortogonal comparison in 2 open field trials in 2013

Days after appl.	Efficacy of sulfoxaflor and references in %		
	sulfoxaflor		
		24 g a.s./ha	**48 g a.s./ha**
3DAA1	Number of trials	2	2
	mean	66	68
	limits	*38 - 93*	*38 - 90*
7DAA1	Number of trials	2	2
	mean	73	75
	limits	*51 - 93*	*43 - 94*

DAA1 = days after the 1st application.

ZRMS conclusion: Whiteflies control in ornamental crops

In 2008-2013, 5 trials (2 open field and 3 greenhouse trials) have been conducted to determine the minimum effective dose rate of sulfoxaflor against whiteflies in ornamental crops. All trials have been carried out in Italy, where sulfoxaflor was tested at various dose rates between 12 and 48 g a.s./ha in *Euphorbia, Lantana* and *Gerbera* crops for the control of *Trialeurodes vaporariorum (*TRIAVA).

ZRMS accepted field efficacy trials as additional supportive trials. Also, the efficacy data set can be completed by results get on the same pest on vegetable crops (cucurbits and solanaceous crops).

The results get on *Euphorbia*, *Lantana* and *Gerbera* crops for the control of *Trialeurodes vaporariorum (*TRIAVA) showed that the claimed dose rate of 48 g sulfoxaflor/ha can be considered as the minimum effective dose against this pest in ornamentals crops grown in protected conditions.

Bemisia tabaci (BEMITA) was not present in the trials on ornamentals. For data get on *Bemisia tabaci* (BEMITA) on solanaceous and cucurbits in greenhouse conditions, a marked dose effect is seen between 24 and 48 g/ha. It is possible to extrapolate these data on *Bemisia tabaci* for ornamentals (PP 1/257 IEET 72 (1)). However, *Bemisia tabaci* is the most difficult of the two pests to control and therefore further trials can be expected to represent the worst case scenario.

At commenting stage, NL commented that "Minimum effectivity at the doses requested was not proven for whitefly control in ornamental crops. The number of efficacy trial on TRIAVA is not sufficient (none on BEMITA) at the proposed application rate/dosage.

IIIA 6.4 Efficacy tests

Field trials were established in order to demonstrate the efficacy of sulfoxaflor in comparison to widely used commercial standards for the control of the target pests claimed in this dRR. Sulfoxaflor was tested at the proposed label rates (minimum effective rates) in the target crops for the control of important aphid and whitefly species. Efficacy was tested under a range of environmental conditions to fully challenge the product. All trials were conducted by officially recognized testing organizations with the Good Experimental Practices (GEP) and followed the appropriate EPPO standards PP 1/135, PP 1/152, PP 1/181, and the pest specific guidelines.
Table 0-9 includes the distribution of trials used for the efficacy analysis showing the number of trials by crop, pest, country, EPPO climatic zone and established year.

Table 0-9 Distribution of trials included in the efficacy analysis.

Crop	Pests	Country / Eppo zone	Year / Number of trials
Cucurbits	Aphids (APHIGO)	Spain/ Mediterranean.	2008/2, 2009/2, 2010/5
		France/ Mediterranean.	2008/1
		Italy/ Mediterranean.	2009/1
		Portugal/ Mediterranean.	2010/1
Total		**12**	**2008/3; 2009/3; 2010/6**
Cucurbits	Whiteflies (TRIAVA, BEMITA)	Spain/ Mediterranean.	2007/1, 2008/3, 2011/3
		United Kingdom/ Maritime	2009/1
		Italy/ Mediterranean.	2011/3
		Greece/ Mediterranean.	2012/2
Total		**13**	**2007/1, 2008/3, 2009/1, 2011/6, 2012/2**
Solanaceous crops	Aphids (APHIGO, MYZUPE)	Spain/ Mediterranean.	2008/4, 2010/3
		Greece/ Mediterranean.	2008/1
		Italy/ Mediterranean.	2008/3, 2009/1, 2010/2
		Hungary/ South-East	2008/1
Total		**15**	**2008/9, 2009/1, 2010/5**
Solanaceous crops	Whiteflies (TRIAVA, BEMITA)	Spain/ Mediterranean	2008/3, 2009/1, 2011/2
		Italy/ Mediterranean.	2007/2, 2008/2, 2009/2, 2010/1 2011/4, 2012/1
		Greece/ Mediterranean.	2010/2, 2012/2
Total		**22**	**2007/2, 2008/5, 2009/3, 2010/3, 2011/6, 2012/3**
Ornamental crops	Aphids (APHISP, MYZUPE, MACSEU)	Italy/ Mediterranean.	2008/1, 2011/4, 2012/4
Total		**9**	**2008/1 ,2011/4 , 2012/4**
Ornamental crops	Whiteflies (TRIAVA, BEMITA)	Italy/ Mediterranean.	2008/2, 2012/1, 2013/2
Total		**5 (2 indoor + 3 field)**	**2008/2, 2012/1, 2013/2**

Aphid control in cucurbits

Between 2008 and 2010, 12 trials were conducted in Europe to demonstrate the efficacy of sulfoxaflor in comparison to widely used reference products like acetamiprid used at 75 g a.s./ha against *Aphis gossypii* (APHIGO) in cucurbit crops grown in protected situations. The trials were set up in Spain (9 trials), Portugal (1 trial), Italy (1 trial) and France (1 trial) in cucumber (6 trials), zucchini (4 trials) and watermelon (2 trials) crops. The biological performance of sulfoxaflor at 24 g a.s./ha was evaluated when sprayed as a single application at the crop development stage of BBCH 20-89. The water volume used was 490-1,000 L/ha, sprayed with a backpack sprayer. The natural infestation level at application was sufficient (1 – 513 aphids / leaf) to obtain reliable results. Some other aphid species like *Aphis fabae* (APHIFA), *Myzus persicae* (MYZUPE) and *Aphis nasturtii* (APHINA) have been also tested in a few cucurbit trials but in open field conditions. These 4 trials were carried out in Spain (2), France (1) and Portugal (1) between 2008 and 2010, to determine the efficacy of sulfoxaflor in comparison to the reference acetamiprid (75 g a.s./ha) against MYZUPE (2 trials), APHINA (1 trial) and APHIFA (1 trial) in melon and zucchini crops grown in open field.

Sulfoxaflor at 24 g a.s./ha was efficacious and comparable to acetamiprid at each assessment intervals against APHIGO, which is the dominant aphid species in cucurbit crops (**Table 0-10**). Sulfoxaflor in the open field trials on MYZUPE, APHINA and APHIFA showed similar results to APHIGO. With the available limited number of trials it is not possible to set specific rates for the minor species but it can be concluded that applications of 24 g a.s./ha of sulfoxaflor, which is the minimum effective dose rate for *Aphis gossypii*, also sufficient on the other aphid species present in cucurbit crops. Therefore, 24 g a.s./ha rate of sulfoxaflor is claimed for the control of all aphid species in cucumber crops grown in protected situations.

Table 0-10 Efficacy of sulfoxaflor in comparison to the reference acetamiprid against aphids (APHIGO) in cucurbits grown in protected situations.

Days after application	**Number of trials**	**Efficacy in %**			
		sulfoxaflor		**acetamiprid**	
		24 g a.s./ha		**75 g a.s./ha**	
		mean	*limits*	**mean**	*limits*
1-2	6	82.4	*72.7 - 97.5*	88.5	*77 - 97*
3	4	92.7	*84.1 - 100*	96.6	*93 - 100*
7-9	8	99.9	*99.3 - 100*	99	*95.4 - 100*
13-14	8	99.3	*96.9 - 100*	96.7	*96.1 - 99.9*
20-21	7	96.1	*92.7 - 100*	96.5	*91.4 - 99.9*

ZRMS conclusion: Aphids control in cucurbits

Between 2008 and 2010, 12 Mediterranean trials were conducted in Spain (9 trials), Portugal (1 trial), Italy (1 trial) and France (1 trial) in cucumber (6 trials), zucchini (4 trials) and watermelon (2 trials) crops grown in protected situations against Aphis gossypii (APHIGO).

Some other aphid species like *Aphis fabae* (APHIFA), *Myzus persicae* (MYZUPE) and *Aphis nasturtii* (APHINA) have been also tested in a few cucurbit trials but in open field conditions. These 4 trials were carried out in Spain (2), France (1) and Portugal (1) between 2008 and 2010 against MYZUPE (2 trials), APHINA (1 trial) and APHIFA (1 trial) in melon (2 trials) and zucchini (2 trials) crops grown in open field.

The results obtained against APHIGO 12 trials in cucumber, zucchini and watermelon under protected conditions showed that the efficacy of CLOSER applied at the claimed dose of 24 g sulfoxaflor/ha was comparable to that of the reference based on acetamiprid (75 g/ha).

Besides, the 4 additional efficacy results obtained against the other aphids *Aphis fabae* (APHIFA), *Myzus persicae* (MYZUPE) and *Aphis nasturtii* (APHINA) in cucurbits (melon and zucchini) grown in field showed that the efficacy of CLOSER applied at the claimed dose of 24 g sulfoxaflor/ha was comparable to that of the reference based on acetamiprid (75 g/ha).

Aphis gossypii is the aphid the most common indoor pest on cucurbits, and the most difficult to control. The extrapolation table PP 1/257 IEET 37 (2) for minor uses allows extrapolating data from solanaceous to cucurbits, concerning *Myzus persicae*, if needed.

Otherwise, to complete the data set on other aphids that could be present on cucurbits under controlled conditions, further efficacy data are available in outdoor conditions (on cucurbits), and under indoor conditions, on solanaceaous crops.

ZRMS considers that the whole efficacy results support the use of the product CLOSER to control all aphids in cucurbits grown in greenhouse.

Aphid control in solanaceous vegetable crops

Between 2008 and 2010, 15 trials were conducted in Europe to demonstrate the efficacy of sulfoxaflor in comparison to widely used reference products including acetamiprid (75 g a.s./ha) against *Aphis gossypii* (10 trials) and *Myzus persicae* (6 trials) in ~~cucurbit~~ solanaceous crops grown in protected situations. One trial had both species evaluated.
The trials were set up in Spain (7 trials), Greece (1 trial), Italy (6 trial) and Hungary (1 trial) in pepper (9 trials), tomato (2 trials) and eggplant (4 trials) crops. The biological performance of sulfoxaflor at 24 g a.s./ha was evaluated when sprayed as a single application at the crop development stage of BBCH 29-89. The water volume used was 500-1,000 L/ha, sprayed with a backpack sprayer. The natural infestation level at application was sufficient (0.4 – 4.62 aphids / leaf) to obtain reliable results.
Sulfoxaflor at 24 g a.s./ha was efficacious at either knock down or the long lasting activity being comparable to acetamiprid at each assessment time against both *Aphis gossypii* (APHIGO) and *Myzus persicae* (MYZUPE), which are the dominant aphid species in solanaceous vegetable crops (**Table 0-11**). Therefore, 24 g a.s./ha rate of sulfoxaflor is claimed for the control of all aphid species in solanaceous vegetable crops grown in protected situations.

Table 0-11 Efficacy of sulfoxaflor in comparison to the reference acetamiprid against aphids (APHIGO and MYZUPE) in solanaceous crops grown in protected situations.

Pest species	Days after appl.	Efficacy in %					
		sulfoxaflor			acetamiprid		
		24 g a.s./ha			75 g a.s./ha		
		mean	*Limits*	nr of trials	mean	*limits*	nr of trials
APHIGO	2-3	96.1	*87.2-100*	6	97.9	*94.1-100*	6
	6-8	93.8	*75.0-100*	6	93.7	*75.0-99.8*	6
	13-15	99.0	*97.4-100*	5	98.4	*93.1-100*	5
	20-22	98.0	*94.8-100*	5	93.6	*82.2-100*	5
MYZUPE	2-3	98.5	*93.7-100*	5	93.1	*78.9-100*	5
	6-8	99.9	*99.7-100*	5	98.2	*91.8-100*	5
	13-15	99.8	*99.5-100*	5	99.9	*99.6-100*	5
	20-22	99.5	*98.5-100*	3	98.6	*97.8-100*	3
TOTAL DATA*	2-3	97.1	*87.2-100*	10	95.8	*78.9-100*	10
	6-8	96.6	*75.0-100*	10	95.8	*75.0-100*	10
	13-15	99.4	*97.4-100*	9	99.2	*93.1-100*	9
	20-22	98.6	*94.8-100*	7	96.8	*82.2-100*	7

* One trial had both species tested

ZRMS conclusion: Aphids control in solanaceous crops

Between 2008 and 2010, 15 trials were conducted in Europe to demonstrate the efficacy of sulfoxaflor in comparison to widely used reference products including acetamiprid (75 g a.s./ha) against *Aphis gossypii* (10 trials) and *Myzus persicae* (6 trials) in cucurbit solanaceous crops grown in protected situations. One trial had both species evaluated. The trials were set up in Spain (7 trials), Greece (1 trial), Italy (6 trial) and Hungary (1 trial) in pepper (9 trials), tomato (2 trials) and eggplant (4 trials) crops.

The results obtained in pepper, tomato and eggplant grown under protected conditions against *Aphis gossypii* (APHIGO, 10 trials) and *Myzus persicae* (MYZUPE, 6 trials) showed that the efficacy of CLOSER applied at the claimed dose of 24 g sulfoxaflor/ha was comparable to that of the reference based on acetamiprid (75 g/ha).

The efficacy level of CLOSER can be considered as satisfactory in solanaceous crops grown in protected conditions to control aphids.

Aphid control in ornamental crops

Between 2008 and 2012, 9 trials were conducted in Italy to demonstrate the efficacy of sulfoxaflor in comparison to main reference products against aphids in different ornamental crops grown in greenhouses. The tested aphid species were *Aphis gossypii* - APHIGO (2 trials), *Myzus persicae* – MYZUPE (2 trials), *Macrosiphum euphorbiae* – MACSEU (3 trials), *Aphis fabae* – APHIFA (1 trial) and a mixed population of aphids – APHISP (1 trial). Sulfoxaflor was tested at 24 g a.s./ha rate in *Chrysanthemum* (4 trials), *Calendula officinalis, Bellis perennis* (2 trials) , *Geranium spp.* and *Nicotiana rustica*. Reference products were acetamiprid applied at 60-75 g a.s./ha rate, flonicamid at 60-70 g a.s./ha rate, spirotetramat at 120 g a.s./ha rate. One application was carried out at development stage of BBCH 59-65, depending on the crop. The water volume used was 400 - 1200 L/ha, sprayed with a backpack sprayer. The natural infestation level at application was sufficient (1.52 – 31.7 mobile forms /shoot) to obtain reliable results.

The efficacy results are summarized in
Table 0-12, which shows sulfoxaflor applied at 24 g a.s./ha rate delivered sufficient aphid control during the whole evaluation period (2-3 weeks) being at least as good as the tested reference products (acetamiprid, flonicamid, spirotetramat). There was no significant difference between the susceptibility of the tested aphid species to sulfoxaflor, the recommended rate of 24 g a.s./ha provided sufficient knock down and long lasting activity on each species. These results were similar to the results obtained in solanaceous and cucurbit crops. Therefore, 24 g a.s./ha rate of sulfoxaflor is claimed for the control of all aphid species in ornamental crops grown in protected situations.

Table 0-12 Efficacy of sulfoxaflor in comparison to reference products against aphids (MACSEU, APHIGO, APHIFA and MYZUPE) in ornamental crops grown in protected situations.

Days after appl.		Efficacy in %		
		sulfoxaflor	acetamiprid	flonicamid
		24 g a.s./ha	60-75 g a.s./ha	60-70 g a.s./ha
1-3DAA1	nr of trials	8	8	8
	mean	93.0	89.9	82.8
	mean limits	*67.1-100*	*54-100*	*47.3-100*
7DAA1	nr of trials	8	8	8
	mean	98.2	94.5	92
	mean limits	*93.3-100*	*67.5-100*	*64-100*
14DAA1	nr of trials	8	8	8
	mean	98.4	94.2	93.4
	mean limits	*91.4-100*	*56.9-100*	*50.8-100*
20-28DAA1	nr of trials	5	5	5

	mean	97.3	89.9	88.6
	mean limits	*91.4-100*	*56.9-100*	*50.8-100*

ZRMS conclusion: Aphids control in ornamentals

Between 2008 and 2012, 9 trials were conducted in Italy to demonstrate the efficacy of sulfoxaflor in comparison to main reference products against aphids in different ornamental crops grown in greenhouses. The tested aphid species were *Aphis gossypii* - APHIGO (2 trials), *Myzus persicae* – MYZUPE (2 trials), *Macrosiphum euphorbiae* – MACSEU (3 trials), *Aphis fabae* – APHIFA (1 trial) and a mixed population of aphids – APHISP (1 trial). Sulfoxaflor was tested at 24 g a.s./ha rate in *Chrysanthemum* (4 trials), *Calendula officinalis*, *Bellis perennis* (2 trials) , *Geranium* spp. and *Nicotiana rustica*.

The results obtained under protected conditions against *Aphis gossypii* (APHIGO, 2 trials), *Myzus persicae* (MYZUPE, 2 trials), *Macrosiphum euphorbiae* (MACSEU, 3 trials), *Aphis fabae* (APHIFA, 1 trial) and a mixed population of aphids (APHISP, 1 trial) in *Chrysanthemum* (4 trials), *Calendula officinalis* (2 trials), *Bellis perennis*, *Geranium* and *Nicotiana rustica* species showed that the efficacy of CLOSER applied at the claimed dose of 24 g sulfoxaflor/ha was comparable or superior to that of the references acetamiprid (60-75 g/ha) and flonicamid (60-70 g/ha).

The data set on ornamentals can be completed by efficacy results get on same aphid species, on protected vegetable crops (cucurbits and solanaceous crops).
The efficacy level of CLOSER can be considered as satisfactory in ornamentals crops grown in protected conditions to control aphids.
According to EPPO extrapolation table, it is possible to extrapolate data obtained on *Aphis gossypii* in cucurbits for the same aphid in ornamentals (PP 1/257 IEET 27 (3)).

Whitefly control in cucurbits

Between 2008 and 2013, 13 trials were conducted in Europe to demonstrate the efficacy of sulfoxaflor in comparison to commercial standards against whiteflies *(Trialeurodes vaporariorum* and *Bemisia tabaci)* in cucurbit crops grown in protected situations. The trials were set up in Spain (8 trials), Italy (3 trials), Greece (1 trial) and the United Kingdom (1 trial) in cucumber (9 trials) and zucchini (4 trials) crops at their development stage of BBCH 12-86. A single application of sulfoxaflor at 48 g a.s./ha was compared to two applications of 24 g a.s./ha and various standards like acetamiprid (75 g a.s./ha) depending on the crop and the situation. The water volume used was 400-1,000 L/ha sprayed with a backpack sprayer. The natural infestation level at application was sufficient (4 – 513 whiteflies / leaf) to obtain reliable results.

The knock down activity of sulfoxaflor at 24 g a.s./ha rate was sufficient but should have been repeated after 7-14 days to deliver residual control. This technology delivered sufficient efficacy against *Trialeurodes vaporariorum* up to 4 weeks performing better than the standards. The efficacy level was slightly weaker against *Bemisia tabaci* but sulfoxaflor was still equal to acetamiprid. **Table 0-13** show the efficacy comparison results on both species by evaluation time. Sulfoxaflor applied at 48 g a.s./ha delivered similar efficacy to that of the split application (2x24 g a.s./ha rate) on both species being at least as good in the overall whitefly control as the standards including acetamiprid. As there was no significant difference in the two applications, and both treatments were comparable to standards, sulfoxaflor applied at 48 g a.s./ha rate and the split application of 2x24 g a.s./ha using 7-14 days spray interval are the recommended label rates for sulfoxaflor against whiteflies (TRIAVA and BEMITA) in cucurbit crops grown in protected situations. The split application is reasonable when applications are targeting the egg hatching stage. In the case of high infestation pressure or more developed stages, one spray is recommended with GF-2626 at the rate of 400 ml/ha.

Table 0-13 Efficacy of sulfoxaflor in comparison to reference product against *Trialeurodes vaporariorum* (TRIAVA) and *Bemisia tabaci* (BEMITA) in cucurbit crops grown in protected situations (cucurbits: cucumber and zucchini)

	Days after appl.		Efficacy in % and mean comparison

Species			sulfoxaflor	sulfoxaflor	acetamiprid
			2x 24 g a.s./ha	1x 48 g a.s./ha	1x 75 g a.s./ha
TRIAVA	1-4DAA1	nr of trials	2	2	2
		mean	65	61.4	70.2
		limits	52.8-77.2	60.9-61.8	66.1-74.2
	7-14DAA1	nr of trials	3	3	3
		mean	70.4	83	59.4
		limits	58.9-87.5	71.6-95	46.4-77.4
	5-9DAA2	nr of trials	4	4	4
		mean	84.2	90	65.9
		limits	65.2-96.4	83.4-94.4	39-84.1
	13-15DAA2	nr of trials	2	2	2
		mean	90.5	74.6	53.9
		limits	87.9-93	70.9-78.4	25.8-82.1
BEMITA	1-4DAA1	nr of trials	1	1	1
		mean	63.2	70.2	51.1
		mean limits	63.2	70.2	51.1
	5-9DAA1	nr of trials	3	3	3
		mean	65	70.8	76.6
		mean limits	58.1-71.9	68.4-74.4	72.6-80.4
	5-9DAA2	nr of trials	3	3	3*
		mean	71.8	77.1	86.9
		limits	56.5-91.5	63.5-93.5	82-95.3

DAA1 = days after the 1st application; DAA2 = days after the 2nd application
* means 2 applications of acetamiprid was done

ZRMS conclusion: Whiteflies control in cucurbits

Between 2008 and 2013, 13 trials were conducted in Europe to demonstrate the efficacy of sulfoxaflor in comparison to commercial standards against whiteflies (*Trialeurodes vaporariorum* and *Bemisia tabaci*) in cucurbit crops grown in protected situations. The trials were set up in Spain (8 trials), Italy (3 trials), Greece (1 trial) and the United Kingdom (1 trial) in cucumber (9 trials) and zucchini (4 trials) crops.

The results obtained under protected conditions against *Trialeurodes vaporariorum* (TRIAVA, 6 trials) and *Bemisia tabaci* (BEMITA, 7 trials) in cucumber (9 trials) and zucchini, 4 trials) showed that the efficacy of CLOSER applied at the claimed dose of 48 g sulfoxaflor/ha was superior or equivalent to the reference based on acetamiprid (75 g/ha).
The proposed rate of 48 g a.s./ha can be split into 2 applications of 24 g a.s./ha against whiteflies in cucurbits crops grown in protected conditions. However, we don't understand the interest of such comparison. In practice, the product will not be applied at a 7 day interval (the interval is too low; PL proposed to increase this interval to 10-21 days). The interest of 2 applications is to target 2 different pest generations (and to do none consecutive applications, for resistance management).

No need for extrapolation table. Otherwise, this is the appropriate table, if need: PP 1/257 IEET 72 (1).

Whitefly control in solanaceous vegetable crops

Between 2007 and 2012, 13 trials on *Bemisia tabaci* and 9 trials on *Trialeurodes vaporariorum* were conducted to demonstrate the efficacy of sulfoxaflor in comparison to commercial standards against whiteflies in solanaceous vegetable crops (tomato-12 trials, pepper-5 trials,eggplant-5 trials) grown in protected situations. Trials from Italy (12 trials), Greece (4 trials) and Spain (6 trials) were used where one application of sulfoxaflor was tested at 48 g

a.s./ha and compared to two applications of 24 g a.s./ha and various standards like acetamiprid (75 g a.s./ha). The natural infestation level at application was sufficient (1 – 691 whiteflies / leaf) to obtain reliable results. Applications were carried out at development stages betwen BBCH 13 and BBCH 48 of the crops.
The efficacy of sulfoxaflor was comparable to that of the standards and provided sufficient control of whiteflies when applied as 2 sprays with 7-14 days interval at the dose rate of 24 g a.s./ha or 1 spray at the dose rate of 48 g a.s./ha. The knockdown on the adults was generally better in the sulfoxaflor treatments than in the standards and similar to standards against the larvae delivering slightly better efficacy on BEMITA than on TRIAVA.
Table 0-14 show the efficacy comparison results on both species at the different evaluation times. The split application performed better when the first application was at the egg hatching stage. In the case of high infestation pressure or more developped stages, the one spray of 48 g a.s./ha performed better. As there was no significant difference in the two applications, and both treatments were comparable to standards, sulfoxaflor applied at 48 g a.s./ha rate and the split application of 2x24 g a.s./ha using 7-14 days spray interval are the recommended label rates for sulfoxaflor against whiteflies (TRIAVA and BEMITA) in solanaceous crops grown in protected situations. The split application is recommended when applications are targeting the egg hatching stage. In the case of high infestation pressure or more developed stages, one spray is recommended with GF-2626 at the rate of 400 ml/ha.

Table 0-14 Efficacy of sulfoxaflor in comparison to the reference acetamiprid against *Trialeurodes vaporariorum* (TRIAVA) and *Bemisia tabaci* (BEMITA) in solanaceous vegetable crops grown in protected situations (solanaceous: tomato, pepper and aubergine)

Species	Days after appl.		Efficacy in % and mean comparison		
			sulfoxaflor	sulfoxaflor	acetamiprid
			2x 24 g a.s./ha	1x 48 g a.s./ha	1x75-100 g a.s./ha
TRIAVA	1-3 DAA1	nr of trials	4	4	4
		mean	65.3	65.5	58.8
		limits	*45.4-91.1*	*37.2-95*	*13.5-89.8*
	7 DAA1	nr of trials	4	4	4
		mean	62.8	72.2	72.2
		limits	*37.4-89*	*51.7-88.3*	*58.1-95.3*
	14 DAA1	nr of trials	3	3	3
		mean	67.1	69.8	62.3
		limits	*52-83.2*	*56.8-86.5*	*57-68.6*
	3-7 DAA2	nr of trials	3	3	3
		mean	77	68.4	71.9
		limits	*66.1-92.1*	*56.8-75.7*	*57-88.1*
	14 DAA2	nr of trials	3	3	3
		mean	74.7	68	60.5
		limits	*64.5-91.9*	*56-79.4*	*50.2-76.2*
BEMITA	1-3 DAA1	nr of trials	3	3	3
		mean	74.8	76.8	76.9
		limits	*52-86.8*	*53.8-88.5*	*52.1-90.8*
	7 DAA1	nr of trials	3	3	3
		mean	77.8	84.5	76.4
		limits	*68.6-89*	*73.9-93.1*	*57.4-87.2*
	14 DAA1	nr of trials	3	3	3
		mean	77.5	85.7	70
		limits	*65.7-88.7*	*81-88.5*	*50.7-82.3*
	7 DAA2	nr of trials	2	2	2
		mean	77.9	81.9	72.8

		limits	*62.1-93.8*	*71.3-92.6*	*64.2-81.4*
	14 DAA2	nr of trials	2	2	2
		mean	61.4	72.6	61.4
		limits	*61.2-61.6*	*70.6-74.6.*	*61.2-61.6*

DAA1 = days after the 1st application; DAA2 = days after the 2nd application

ZRMS conclusion: Whiteflies control in solanaceous

Between 2007 and 2012, 13 trials on *Bemisia tabaci* and 9 trials on *Trialeurodes vaporariorum* were conducted to demonstrate the efficacy of sulfoxaflor in comparison to commercial standards against whiteflies in solanaceous vegetable crops (tomato-12 trials, pepper-5 trials,eggplant-5 trials) grown in protected situations. Trials from Italy (12 trials), Greece (4 trials) and Spain (6 trials) were used.

The results under protected conditions obtained against *Trialeurodes vaporariorum* (TRIAVA, 9 trials) and *Bemisia tabaci* (BEMITA, 13 trials) in tomato (12 trials), pepper (5 trials) and eggplant (5 trails) showed that the efficacy of CLOSER applied at the claimed dose of 48 g sulfoxaflor/ha was comparable or superior to the reference based on acetamiprid (75-100 g/ha).
The proposed rate of 48 g a.s./ha can be split into 2 applications of 24 g a.s./ha against whiteflies in solanaceous grown in protected conditions. However, we don't understand the interest of such comparison. In practice, the product will not be applied at a 7 day interval (the interval is too low; PL proposed to increase this interval to 10-21 days). The interest of 2 applications is to target 2 different pest generations (and to do none consecutive applications, for resistance management).
The efficacy level of CLOSER can be considered as satisfactory in solanaceous crops grown in protected conditions to control whiteflies.
No need for extrapolation table. Otherwise, this is the appropriate table, if need: PP 1/257 IEET 72 (1).

Whitefly control in ornamental crops

In 2008-2013, 5 trials (2 open field and 3 greenhouse trials) have been conducted to demonstrate the efficacy of sulfoxaflor against whiteflies in ornamental crops. All trials have been carried out in Italy, where sulfoxaflor was tested at various dose rates between 12 and 48 g a.s./ha in *Euphorbia, Lantana* and *Gerbera* crops for the control of *Trialeurodes vaporariorum* (TRIAVA). The efficacy of the proposed label rates (2x24 and 1x48 g a.s./ha) was compared to the efficacy of some widely used EU standard products like acetamiprid, flonicamid, imidacloprid and spirotetramat. The natural infestation level at application was sufficient (0.5 – 15.5 mobile forms/leaf) to obtain reliable results. Applications were carried out at development stages between BBCH 33 and 64 in open fields and between BBCH 19 and 67 in greenhouses.

Sulfoxaflor applied at 48 g as/ha rate delivered sufficient whitefly control especially in the first 2 weeks in both the open field and greenhouse trials. Later, its efficacy decreased but was still better than that of the standard products. The efficacy of 24 g a.s./ha rate started decreasing after the first week but repeating the treatment increased the efficacy, which became even better than that of the residual efficacy of the 1x48 g a.s./ha of sulfoxaflor or the standard treatments (**Table 0-15**). As there was no significant difference in the two sulfoxaflor applications, and both treatments were comparable to standards, sulfoxaflor applied at 48 g a.s./ha rate and the split application of 2x24 g a.s./ha using 7-14 days spray interval are the recommended label rates for sulfoxaflor against whiteflies in ornamental crops grown in protected situations. There are no available results on *Bemisia tabaci* but trial results from cucurbit and solanaceous crops showed similar efficacy of sulfoxaflor on both species so we claim the efficacy on all whiteflies in ornamental crops too. The split application is reasonable when applications are targeting the egg hatching stage. In the case of high infestation pressure or more developed stages, one spray is recommended with GF-2626 at the rate of 400 ml/ha. These observations confirmed the results obtained in solanaceous and cucurbit vegetable crops.

Table 0-15 Efficacy of sulfoxaflor in comparison to reference products against *Trialeurodes vaporariorum* (TRIAVA) in ornamental crops in protected conditions.

Days after appl.		Efficacy data for treatments				
		sulfoxaflor	sulfoxaflor	acetamiprid	flonicamid	spirotetramat

		24 g a.s./ha (**)	48 g a.s./ha (*)	75 g a.s./ha (*)	60 g a.s./ha (*)	144 g a.s./ha (*)
1-3DAA1	nr of trials	3	3	3	3	3
	mean	62.2	72.8	51.2	44.8	37.1
	mean limits	*51.1-81.4*	*48.1-87.4*	*20.1-79*	*41-50.3*	*20.5-45.5*
7DAA1	nr of trials	3	3	3	3	3
	mean	69.7	77.5	63.7	60.8	53.2
	mean limits	*58.5-86.6*	*59.5-90.3*	*38.8-86.5*	*52.7-68.1*	*28.7-69.6*
14DAA1 =7DAA2	nr of trials	3	3	3	3	3
	mean	76.3	67	67.2	52.5	48.5
	mean limits	*63.5-85.8*	*53.5-82.3*	*41.6-91*	*41.7-65.8*	*36.4-63.2*
21DAA1 =14DAA2	nr of trials	3	3	3	3	3
	mean	72.8	62.9	67.7	56	51.4
	mean limits	*61.5-80.5*	*57.3-70.9*	*42-84.4*	*40-67.7*	*39.6-61.7*

(*) = 1 single spray); (**) = 2 sprays with 7 days interval; DAA1 = days after the 1stapplication; DAA2 = days after the 2nd application

ZRMS conclusion: Whiteflies control in ornamental crops

In 2008-2013, 5 trials (2 open field and 3 greenhouse trials) have been conducted to demonstrate the efficacy of sulfoxaflor against whiteflies in ornamental crops. All trials have been carried out in Italy, where sulfoxaflor was tested at various dose rates between 12 and 48 g a.s./ha in *Euphorbia*, *Lantana* and *Gerbera* crops for the control of *Trialeurodes vaporariorum* (TRIAVA).

The results under protected conditions obtained in *Euphorbia*, *Lantana* and *Gerbera* crops for the control of *Trialeurodes vaporariorum (*TRIAVA, 3 trials) showed that the efficacy of CLOSER applied at the claimed dose of 48 g sulfoxaflor/ha was superior or equivalent to the reference based on acetamiprid (75 g/ha), flonicamid (60 g/ha) and spirotetramat (144 g/ha).
Bemisia tabaci (BEMITA) was not present in the trials. It is possible to extrapolate data obtained with solanaceous or cucurbits against *Bemisia tabaci* for ornamentals (PP 1/257 IEET 72 (1)).

The proposed rate (registration rate) of 48 g a.s./ha can be split into 2 applications of 24 g a.s./ha against whiteflies, in ornamental crops grown in protected conditions. However, we don't understand the interest of such comparison. In practice, the product will not be applied at a 7 day interval (the interval is too low; PL proposed to increase this interval to 10-21 days). The interest of 2 applications is to target 2 different pest generations (and to do none consecutive applications, for resistance management).
The efficacy level of CLOSER can be considered as satisfactory in ornamentals crops grown in protected conditions to control whiteflies.

ZRMS conclusion about efficacy data of the product CLOSER

The overall data showed that the efficacy level of the product CLOSER is considered as satisfactory for all claimed uses. These conclusions, drawn by zRMS, may be confirmed at MS level considering:
- Extrapolations possibilities on minor uses and/or pest group,
- The distribution of trials across Europe, considering the type of greenhouse / glasshouse / tunnels.

Efficacy data submitted for uses in greenhouse (current dRR) and those in field (another dRR) are complementary. For southern zone, the conclusions obtained in this dRR are in line with those obtained in the other one.

IIIA 6.5 Effects on yield and quality

IMPACT ON THE QUALITY OF PLANTS AND PLANT PRODUCTS

CUCURBITS

Materials and Methods

In 2010, 1 trial was conducted in the EU regulatory Southern zone in Italy to determine the impact of sulfoxaflor on the quality of cucurbit products. The taint test was done on cucumber to evaluate the possible effects of sulfoxaflor (GF-2626) applied 1 or 3 days before harvest at 48 g a.s./ha dose rate on the taste and smell of the final product (cucumber fruits). The method applied for taint tests was based on the EPPO (European and Mediterranean Plant Protection Organization) standard PP 1/242 that provides general guidance on the requirements for testing whether harvested plants or plant products are tainted by plant protection products. The test was conducted on a commercial variety of cucumber (Modam) cultivated in a glass-house in Italy.
A quality evaluation was carried out at CNR-IBIMET laboratory by a group of specialists on sensory analysis before the taint test. Cucumbers were evaluated according to the Part A of Annex I to the COMMISSION REGULATION (EC) No 1221/2008, laying down the general marketing standards for Fruit and vegetables not covered by a specific marketing standard. The evaluation carried out in this preliminary session concerned quality, size and uniformity. Firmness was measured with a penetrometer "Fruit tester FG". TSS was measured on vegetable juice by using a portable reflectometer (Brixstix, Techniquip Corporation, Livermore, CA, USA). TA was measured with an

automatic titrator (Titroline 96, Schott, Mainz, Germany). The colorimeter model is Chroma Meter CR 400 (Konica Minolta, CIE L*a*b*).
The sensory analysis were conducted as 3 triangle tests by 34 judges. The judges were scheduled in groups of six to ensure full randomization within groups. They noted the presence of any taint or any significant difference in flavour they found between the samples.

Results
No significant differences between the two samples (fruits harvested either 1 or 3 days after application) treated with GF-2626 at a rate of 48 g a.s./ha, and the untreated sample, were detected through the instrumental and sensory analysis. No perceived "taint" was recorded by any assessor.
Tasting tests performed according to EPPO protocol produced the unequivocal outcome of excluding the presence of any taint to cucumbers arising from the use of GF-2626 from cucumber product harvested at either 1 DAA or 3 DAA. It was concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the plants or plant products.

SOLANACEOUS VEGETABLES

Materials and Methods
In 2010, 1 trial was conducted in the EU regulatory Southern zone in Italy to determine the impact of sulfoxaflor on the quality of solanaceous vegetable products. The taint test was done on tomato to evaluate the possible effects of sulfoxaflor (GF-2626) applied 1 or 3 days before harvest at 48 g a.s./ha dose rate on the taste and smell of the final product (tomato fruits). The method applied for taint tests was based on the EPPO (European and Mediterranean Plant Protection Organization) standard PP 1/242 that provides general guidance on the requirements for testing whether harvested plants or plant products are tainted by plant protection products. The test was conducted on a commercial variety of tomato (Tirsa) cultivated under a glass-house in Italy.
A quality evaluation was carried out at CNR-IBIMET laboratory by a group of specialists on sensory analysis, agronomic science and statistics, before the taint test. The visual evaluation concerned quality, size and uniformity of fruits. The sensory analysis were conducted as 3 triangle tests by 39 judges. The judges were scheduled in groups of six to ensure full randomization within groups. They noted the presence of any taint or any significant difference in flavour they found between the samples.

Results
No significant differences between the two samples (fruits harvested either 1 or 3 days after application) treated with GF-2626 at a rate of 48 g a.s./ha, and the untreated sample, were detected through the instrumental and sensory analysis. No perceived "taint" was recorded by any assessor.
Tasting tests performed according to EPPO protocol produced the unequivocal outcome of excluding the presence of any taint to tomatoes arising from the use of GF-2626 from tomato product harvested at either 1 DAA or 3 DAA. It was concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the plants or plant products.

ORNAMENTALS

As there was no phytotoxicity symptoms observed in the efficacy and selectivity trials no specific study was conducted. It is concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the plants or plant products.

ZRMS conclusion about the impact on the quality of plants and plant products
No negative effect on qualitative parameters was seen following the application of the product CLOSER on intended crops. However, for ornamentals, considering the high diversity of crops and cultivars, and due to the importance of the visual aspects for those plants, it is not possible to exclude any effect on those crops, even if no phytotoxicity was seen in trials.
About a taint effect, 2 taint trial tests were carried out on fresh products (cucumber and tomato), without any negative effect.

EFFECTS ON THE PROCESSING PROCEDURE

CUCURBITS and SOLANACEOUS VEGETABLES

No additional data was generated because the taint test trial proved no taint in fresh produce. It is concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the processing procedures.

ORNAMENTALS

No additional data was generated. It is concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the processing procedures.

ZRMS conclusion about the effects on the processing procedure
Intended crops are not concerned by biological transformation processes.

EFFECTS ON THE YIELD OF TREATED PLANTS AND PLANT PRODUCTS

CUCURBITS, SOLANACEOUS VEGETABLE AND ORNAMENTAL CROPS

No additional data (yield trials in non-infested crop) was generated because no phytotoxicity was observed in any trial. It is concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the yield of treated plants and plant products.

ZRMS conclusion about the effects on the yield of treated plants and plant products
No negative effect on the yield is expected following the application of the product CLOSER on intended crops.

IIIA 6.6 Adverse effects

PHYTOTOXICITY TO HOST CROP

CUCURBITS

During the development program between 2007 and 2013, several cucurbit crops and varieties were tested in Europe to evaluate the efficacy and selectivity of sulfoxaflor against aphids and whiteflies in protected situations. Sulfoxaflor was tested in 22 trials at various dose rates even up to 75 g a.s./ha and in some of these trials, 2 applications were carried out. In those 22 trials selectivity assessments were also carried out routinely during the evaluation period of the trials in accordance with the EPPO guideline PP 1/135 (3) (guideline for the efficacy evaluation of plant protection products – phytotoxicity assessment). The phytotoxicity on the crop was visually assessed at regular intervals on a 0-100% scale. The trials were carried out in Spain (15), France (1), Italy (5),) Portugal (1) in cucumber (11), zucchini (9) , watermelon (2) crops.

Table 0-16 give an overview of the crops, crop varieties, crop growth stages at application, the maximum sulfoxaflor dose rates and number of applications for which phytotoxicity assessments were recorded in trials carried out in cucurbit crops in protected situations across Europe. All trials were carried out by officially recognized organizations in accordance with the Principles of Good Experimental Practice.

Table 0-16 Overview of the crops, crop varieties, crop growth stages at application, the maximum sulfoxaflor dose rates and number of applications for which phytotoxicity assessments were recorded in trials carried out in cucurbit crops in protected situations in Europe.

Trial report No.	Max. sulfoxaflor dose rate in g a.s./ha	Nr of sprays	Crop	Crop variety	Crop stage at application (BBCH)
ES07X03008SC01	75	2	Cucumber	Unknown	Unknown
ES08C1C003MT01C	36	1	Cucumber	Amalia	15-51
ES08C1C003MT02C	36	1	Zucchini	Suso	51-61
ES08C1C019JM01	72	2	Cucumber	Granada	65-85, 65-85
ES08C1C019JM02	72	2	Zucchini	Local	65-85, 65-85
ES08C1C176SC01	24	2	Cucumber	Unknown	18-19, 51-52
FR08C1C065CR04C	36	1	Cucumber	Staphyt	71-71
IT08C1C110AF01	48	1	Zucchini	Greyzini	76-77
IT08C1C137AF01	24	1	Zucchini	Geode	81-81
EA09X03002JM01	25	1	Cucumber	Aniko	65-71
ES09X03002JM03	24	1	Cucumber	Unknown	51-67
ES09X03002SC01	25	1	Cucumber	Unknown	67-71
ES09X03010JM02	75	2	Zucchini	Kora	65-73, 65-73
IT09X03002LA01	25	1	Zucchini	Parthenon F1	52-71
IT09X03010AF01	48	1	Zucchini	Geode	77-78
ES10C1C014JM01	24	1	Cucumber	Aniko	65-72
ES10C1C014JM02	24	1	Cucumber	Aniko	62-65
ES10C1C014MT02C	24	1	Zucchini	Verde medio	Unknown
ES10C1C014SC01	24	1	Watermelon	Sun red	Unknown
ES10C1C014SK01	24	1	Watermelon	Sun red	67-71
PT10C1C014MT01C	24	1	Zucchini	Mykonos	79-81
IT13C1C097ET02C	24	2	Cucumber	Ekron	72-72, 74-74

No incidents of phytotoxicity were recorded in any of the trials carried out in cucurbit crops grown in protected situations during the sulfoxaflor development program between 2007 and 2013 in Europe and discussed above. Sulfoxaflor proved to be safe up to a dose rate of 75 g a.s./ha even when was applied 2 times. The same observation was done in open field conditions discussed in the relevant GF-2626 biological dossier. It can be concluded that sulfoxaflor (GF-2626), when applied at the proposed dose rates of 48 g a.s./ha with one application or as a split application of 2 x 24 g a.s./ha, perfectly safe to cucurbit crops such as cucumber, zucchini, melon and watermelon grown in protected situations.

SOLANACEOUS CROPS

During the development program between 2007 and 2012, several solanaceous crops and varieties were tested in Europe to evaluate the efficacy and selectivity of sulfoxaflor against aphids and whiteflies in protected situations. Sulfoxaflor was tested in 37 trials at various dose rates even up to 75 g a.s./ha and in some of these trials, 2 applications were carried out. In those 37 trials selectivity assessments were also carried out routinely during the evaluation period of the trials in accordance with the EPPO guideline PP 1/135 (3) (guideline for the efficacy evaluation of plant protection products – phytotoxicity assessment). The phytotoxicity on the crop was visually assessed at regular intervals on a 0-100% scale. The trials were carried out in Spain (13), Italy (18), Greece (5) and Hungary (1) on pepper (14), tomato (14) and eggplant (8). All trials were carried out by officially recognized organizations in accordance with the Principles of Good Experimental Practice (GEP).

Table 0-17 Overview of the crops, crop varieties, crop growth stages at application, the maximum sulfoxaflor dose rates and number of applications for which phytotoxicity assessments were recorded in trials carried out in solanaceous vegetable crops in protected situations in Europe.

Report No.	Max. sulfoxaflor dose rate in g a.s./ha	Nr of sprays	Crop (common)	Variety	Crop BBCH at application
ES08C1C017SC01	48	2	Pepper	not stated	not stated
ES08C1C056SC01	48	2	Pepper	not stated	not stated
ES08C1C176JM01	48	2	Eggplant	Cristal	14-21
ES09X03009RA03	75	2	Pepper	not stated	17-23
ES11C1C014JM01	48	2	Pepper	Italiano Fito	61-63
ES11C1C014MT01C	48	2	Pepper	Carboni	160cm
IT07C1C009LA01	75	1	Tomato	Lancellotto	75-79
IT08C1C114AF01	48	1	Tomato	Pixel	72
IT09X03009AF01	75	1	Tomato	Piccadilly	71
IT09X03009AF02	75	1	Tomato	Pixel	71
IT11C1C014ET01C	48	2	Eggplant	Napoli	73-75
IT11C1C014ET02C	48	2	Tomato	Pixel	79-81
IT11C1C014LA01	48	2	Eggplant	Dalia	51-54
GR10C1C017CM01C	48	2	Tomato	Matias F1	85-87
GR10C1C051CM01C	48	2	Tomato	Matias F1	85-87
GR12C1C022VA01	48	2	Tomato	Belladona	73-75
GR12C1C059VA01	48	1	Tomato	Optima F1	73
IT07C1C009AF01	75	1	Tomato	Shiren	73
IT08C1C137AF02	48	1	Tomato	Piccadilly	71
IT10C1C017ET02C	48	2	Eggplant	Giada	69-85
IT11C1C014AF01	48	2	Tomato	Sir Elyan	71-72
IT12C1C022AF01	48	2	Tomato	Jordan	75-81
ES08C1001MT01C	36	1	Pepper	Italiano	62
ES08C1C001MT02C	36	1	Pepper	Palermo	69-71
ES08C1C001MT03C	36	1	Pepper	Listada Gandía	15
ES08C1C001MT04C	36	1	Eggplant	Paula	16
GR08C1C057VA01	36	1	Pepper	Local variety	73
IT08C1C103ET02C	36	1	Tomato	Genio	71
IT08C1C104ET01C	36	1	Pepper	Vesubio	65
IT08C1C104ET02C	36	1	Pepper	Gemini F1	65
HU08C1C125IM03C	36	1	Pepper	HRF1	16
IT09X03006LA01	24	1	Eggplant	Marika	25
ES10C1C013MT01C	24	1	Eggplant	Zaida	51-71
ES10C1C013MT02C	24	1	Tomato	Boludo	71-79
ES10C1C014MT01C	24	1	Eggplant	Rayada	89
IT10C1C013AF02	24	1	Pepper	Almuden	25
IT10C1C013AF03	24	1	Pepper	Arione	53

No incidents of phytotoxicity were recorded in any of the trials carried out in solanaceous vegetable crops grown in protected situations during the sulfoxaflor development program between 2007 and 2012 in Europe and discussed above. Sulfoxaflor proved to be safe up to a dose rate of 75 g a.s./ha even when was applied 2 times. The same observation was done in open field conditions discussed in the relevant GF-2626 biological dossier. It can be concluded that sulfoxaflor (GF-2626), when applied at the proposed dose rates of 48 g a.s./ha with one application or as a split application of 2x 24 g a.s./ha, perfectly safe to solanaceous vegetable crops grown in protected situations.

ORNAMENTAL CROPS

During the development program between 2008 and 2013, a large number of ornamental crops and varieties were tested to evaluate the efficacy of sulfoxaflor against aphids and whiteflies in both protected situations and open fields. Sulfoxaflor was tested at various dose rates up to 48 g a.s./ha. Three trials were conducted against whiteflies in protected situations and 2 trials in open field situations. Fourteen trials were conducted against aphids, 9 in protected situations and 5 in open fields. On the top of these efficacy trials a special selectivity trial (BE08C1C196HE01C) was carried out in Belgium where many ornamental species and varieties were treated with a very high rate (144 g a.s./ha) of sulfoxaflor applied two times at short interval under low natural light conditions representing an extreme worst case scenario. In all these trials selectivity assessments were carried out in accordance with the EPPO guideline PP 1/135 (3) (guidelines for the efficacy evaluation of plant protection products – phytotoxicity assessment). The phytotoxicity on the crop was visually assessed at regular intervals on a 0-100% scale.

Table 0-18 gives an overview of the crops, crop varieties, crop growth stages at application, the maximum sulfoxaflor dose rates and number of applications for which phytotoxicity assessments were recorded. All trials were carried out by officially recognized organizations in accordance with the Principles of Good Experimental Practice (GEP).

Table 0-18 Overview of the crops, crop varieties, crop growth stages at application, the maximum sulfoxaflor dose rates and number of applications for which phytotoxicity assessments were recorded in trials carried out in ornamental crops in protected situations in Europe.

Trial number	Max. sulfoxaflor dose rate in g a.s./ha	Nr of sprays, max rate	Crop	Crop variety	BBCH growth stage
IT08C1C115ET01C	48	1	Euphorbia pulcherrima	Primero Red	19
IT08C1C118ET02C	48	1	Lantana camara	Radiation	62
IT12C1C022LA01	48	1	Gerbera	Spider	65-67
IT08C1C109ET02C	48	1	Nicotiana rustica	Havana	61
IT11C1C007ET01C	48	1	Calendula officinalis	Calypso	65
IT11C1C007ET02C	48	1	Bellis perennis	Tasso	65
IT11C1C007ET04C	48	1	Chrisanthemum	Malibu Bianco	59
IT11C1C007ET06C	48	1	Chrysanthemum	Aloha	59
IT12C1C013ET02C	48	1	Cascading Geranium	Decora Imperial	65
IT12C1C013ET04C	48	1	Chrysanthemum	Euro	55-60
IT12C1C013ET05C	48	1	Bellis perennis	Bellissima Red	61
IT12C1C013ET06C	48	1	Chrysanthemum	Olawa Red / Decora Imperial	65
BE08C1C196HE01C	144	2	*Aechmea*	Fia	BBCH 41-65
			Aeschynanthus lobbiatus	-	
			Azalea	Hellmut Vogel	
			Begonia tuberhybrida	-	
			Bellis	Robella	
			Bellis	Snowsylva	
			Bellis	Early Sunrise	
			Calathea	Ruffibarba	
			Calathea	Roseo picta	
			Chamaedora	-	
			Cordyline	Redstar	

			Codiaeum	Pictum,	
			Codiaeum	Sunny star	
			Codiaeum	Aucubifolia	
			Codiaeum	Emma	
			Codiaeum	Gold Moon	
			Dischidia ruscifolia	-	
			Dracaena	Marginata	
			Dracaena	Purplecompacta	
			Fargesia	Muriele	
			Ficus benjamina	Golden King	
			Ficus pulmila	-	
			Ficus Guzmania	Scarlet	
			Hatiora bambusoides		
			Hedera	Montgomery	
			Muehlenbeckia	-	
			Peperomia rotundifolia	-	
			Philodendron scandens	-	
			Polyscias balforiana	-	
			Schleffera arboricola	Compacta	
			Spatiphyllum	Alfa	
			Syngonium	White Butterfly	
			Tillandsia cyanea	-	
			Vriesea	Vogue	
			Viola tricolor	-	

35 different ornamental species were tested under greenhouse conditions and treated with sulfoxaflor applied at a minimum of 48 g a.s./ha. 27 of these species were treated 2 times with sulfoxaflor applied at 144 g a.s./ha rate. None of the trials showed crop injury in any sulfoxaflor treatments. The trials were carried out under challenging conditions, comprising different flowering stages of crops as well as exposure to triple rates under low natural light intensity. Intentionally, crops known to be more sensitive were included, such as *Bellis*, *Rosa*, *Chrysanthemum*, *Gerbera*, *Begonia*, *Ficus* species. As no phytotoxicity was ever noticed for any of the tested sulfoxaflor formulations, no further data was generated. The recommended maximum dose rate of sulfoxaflor for which registration is sought in ornamentals is 48 g a.s./ha, which rate proved to be safe not only in greenhouse conditions (as proved in this biological dossier) but also in open field conditions as proved by the field trials summarized in the relevant EU regulatory Southern and Central zone biological dossiers. Although GF-2626 proved to be safe to crops tested in the trials, in the case of known sensitive varieties it is recommended that growers test the product on a small number of plants before treating the whole field to check any possibility of phytotoxicity.

ZRMS conclusion about the phytotoxicity of the product CLOSER in treated crops

No incidents of phytotoxicity were recorded in any of the trials carried out in cucurbits, solanaceous and ornamental crops, grown in protected situations during the sulfoxaflor development program in Europe. Therefore, the phytotoxicity of the product CLOSER can be considered as negligible on treated crops. However, for ornamentals, considering the high diversity of crops and cultivars, and due to the importance of the visual aspects for those plants, it is not possible to exclude any effect on those crops, even if no phytotoxicity was seen in trials.

ADVERSE EFFECTS ON HEALTH OF HOST ANIMALS

This is not an EC data requirement / not required by Regulation (EC 1107/2009).

ADVERSE EFFECTS ON SITE OF APPLICATION

This is not an EC data requirement / not required by Regulation (EC 1107/2009).

ADVERSE EFFECTS ON BENEFICIAL ORGANISMS (OTHER THAN BEES)

The assessment of the impact on beneficial and other non-target organisms is done in the eco-toxicological part of the dossier.

ADVERSE EFFECTS ON PARTS OF PLANT USED FOR PROPAGATING PURPOSES

CUCURBITS, SOLANACEOUS VEGETABLE AND ORNAMENTAL CROPS

As phytotoxicity has never been observed by sulfoxaflor on any crops targeted in this submission and cucurbits, solanaceous vegetable and ornamental crops' seed is generally not saved for propagation purpose by farmers no data was generated. It is concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the germination and the seedling development of the harvested seeds.

ZRMS conclusion about the adverse effects on parts of plant used for propagating purposes No negative impact on propagation is expected following the application of the product CLOSER.

IMPACT ON SUCCEEDING CROPS

A glasshouse study was conducted by Dow AgroSciences to generate dose response data for GF-2032 (sulfoxaflor, 222 g as/l, SC) when applied pre-emergence to 9 monocotyledon and 10 dicotyledon plant species. The methodology for the study was "Dow AgroSciences laboratory methods WB3-PRE", which is regularly used for detecting herbicidal activity of new compounds.

In the pre-emergence test, minor crop injury was noted in the monocotyledon crops corn, sorghum and rice at very high application rates (> 2,000 g a.s./ha). No effects were observed in the pre-emergence test at rates less than or equal to 563 g a.s./ha, well in excess of the proposed label rate for sulfoxaflor products.

No effects were observed on dicotyledonous crop plants such as sugar beet, oilseed rape, sunflower and cotton at rates up to 4,500 g a.s./ha. It was concluded that sulfoxaflor was safe to any potential succeeding or rotational crops.
Another glasshouse study was conducted by Stockbridge Technology Centre Ltd to generate dose response data for of GF-2626 (sulfoxaflor, 120 g as/l, SC) when applied pre-emergence to four monocotyledon and seven dicotyledon crop species. The methodology for the study was based on OECD Guideline 208 (July 2006) Terrestrial (Non-Target) Plant Test: Seedling Emergence and Seedling Growth Test. The test species included four monocotyledon species (Oats, Ryegrass, Maize and Onion) and seven dicotyledon species (Soybean, Oilseed Rape, Cabbage, Tomato, Lettuce, Carrot and Cucumber). Species tested represented the plant families of *Gramineae*, *Liliaceae*, *Leguminosae, Brassicaceae, Solonaceae, Compositae, Umbelliferae* and *Cucurbtaceae*. GF-2626 was applied at five rates (6, 12, 24, 48 and 96 g a.s./ha) and compared with an untreated water only control.

None of the eleven species displayed visual injury from 'pre-emergence' applications of GF2626 applied at 96 g a.s./ha, which is double to the maximum recommended label rate (48 g a.s./ha) for use in cucurbits, solanaceous vegertable crops and ornamentals.

On the basis of these studies it can be concluded that sulfoxaflor, does not pose any risk to succeeding or following crops if applied according to label recommendations.

ZRMS conclusion about the impact of the product CLOSER on succeeding crops

No negative effect on succeeding crops is expected following the application of the product CLOSER.

IMPACT ON OTHER PLANTS INCLUDING ADJACENT CROPS

A glasshouse study was conducted by Dow AgroSciences to generate dose response data for the SC formulation of sulfoxaflor (GF-2032, 222 g as/l, SC) when applied post-emergence to nine monocotyledon and fourteen dicotyledon plant species. The methodology for the study was “Dow AgroSciences laboratory methods WB3-POST”, which is regularly used for detecting herbicidal activity of new compounds.

In the post-emergence herbicidal screening test, minor injury (5%) to wheat at 400 g a.s./ha and slightly more injury to rice at 200 (10%) and 400 g a.s./ha (15%) were noted. No injury was observed in any other species exposed to post-emergent spray of sulfoxaflor (XDE-208) at rates equal to or less than 400 g a.s./ha.

No effects were observed on dicotyledonous crop plants such as sugar beet, oilseed rape, sunflower and cotton at rates up to 400 g a.s./ha. No effects were observed in the test at rates less than or equal to 100 g a.s./ha on any crop tested, well in excess of the proposed label rate for sulfoxaflor products. It was concluded that sulfoxaflor was safe to any potential adjacent crops.

Another glasshouse study was conducted by Stockbridge Technology Centre Ltd to generate dose response data for GF-2626 (sulfoxaflor 120 g as/l, SC) when applied post-emergence to four monocotyledon species and seven dicotyledon species. The methodology for the study was based on OECD Guideline 227 (July 2006) Terrestrial (Non-Target) Plant Test: Vegetative Vigour Test. The dose response data (EC 50 values) was used to assess the risk of GF-2626 (sulfoxaflor 120 g as/l, SC) to terrestrial non-target plants. The test species consisted of four monocotyledon species (Oats, Ryegrass, Maize and Onion) and seven dicotyledon species (Soybean, Oilseed Rape, Cabbage, Tomato, Lettuce, Carrot and Cucumber). Species tested represented the plant families of *Gramineae, Liliaceae, Leguminosae, Brassicaceae, Solonaceae, Compositae,Umbellifera* and *Cucurbitaceae*. GF-2626 was applied at five rates (6, 12, 24, 48 and 96 g a.s./ha) to all eleven species and compared with an untreated water only control. Applications were made post-emergence to all eleven species at growth stages between 2 and 4 true leaves stages (BBCH 12-14).

None of the eleven species displayed visual injury. The high tolerance of all eleven species to post-emergence applications of GF-2626 meant it was not possible to carry out regression analysis and predict EC 50 values based on fresh weight reduction.

On the basis of these studies it can be concluded that sulfoxaflor does not pose any risk to other plants including adjacent crops if applied according to label recommendations.

ZRMS conclusion about the impact of the product CLOSER on adjacent crops
No negative effect on adjacent crops is expected following the application of the product CLOSER.

IIIA 6.7 Possible development of resistance or cross-resistance

Sulfoxaflor belongs to the “sulfoximines” chemical family, which represents a new class of insecticides. Sulfoxaflor exhibits a high degree of efficacy against a wide range of sap-feeding insects, including those resistant to neonicotinoids and other insecticides. Sulfoxaflor is an agonist at insect nicotinic acetylcholine receptors (nAChRs) and functions in a manner distinct from other insecticides acting at nAChRs. The sulfoximines also exhibit structure activity relationships (SAR) that are different from other nAChR agonists such as the neonicotinoids. IRAC assigned nicotinic acetylcholine receptor agonists to Group 4 in their classification system. The neonicotinoids (acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid and thiamethoxam) were assigned to sub group 4A. Nicotine was assigned to sub group 4B and sulfoximines, including sulfoxaflor, were assigned to sub group 4C.

Resistance to neonicotinoid insecticides is usually via metabolism mediated through mixed function oxidases. Studies confirmed that incubation of sulfoxaflor, imidacloprid or acetamiprid with *Drosophila melanogaster*-2 cells lacking the CYP6G1 gene, producing mixed function oxidases, resulted in complete recovery of each of the three compounds. However, when incubated with *Drosophila melanogaster*-2 cells expressing the CYP6G1 gene, there was little recovery of either imidacloprid or acetamiprid. In contrast there was complete recovery of sulfoxaflor in cells expressing CYP6G1 suggesting that sulfoxaflor is a poor substrate for the CYP6G1.

Cross resistance studies in whitefly (*Bemisia tabaci* and *Trialeurodes vaporariorum*), aphids (*Myzus persicae*) and plants hoppers (*Nilaparvata lugens)* using neonicotinoid insecticides such as imidacloprid showed that sulfoxaflor was not cross resistant to this group of insecticides. Cross resistance studies in the aphid *Myzus persicae* showed lack of cross resistance to representative organophosphate, carbamate and pyrethroid insecticides as well. Field studies on neonicotinoid resistant *Myzus persicae* also showed that sulfoxaflor has a good control against *Myzus persicae* where the "target site" mutation was confirmed by genomic analysis. Studies on potential target site resistance to insecticides such as neonicotinoids and spinosyns which target the nACh receptor mutant *Drosophila* target sites resistant to these modes of action showed a lack of target site cross-resistance with sulfoxaflor. It was concluded that sulfoxaflor is differentiated from other insecticides and no cross resistance is likely exist in current populations.

Guidance from the European Plant Protection authorities and interrogation of the Michigan State University resistance database indicated that two aphid species, *M.persicae* and *Aphis gossypii*, and 2 whitefly species *B. tabaci* and *T. vaporariourum*, which are targets for sulfoxaflor, have a high risk of developing resistance. In accordance with EPPO guidelines, a sensitivity baseline was established for these species where no resistant clones were found.
A Resistance Risk Assessment was carried out following EPPO guideline PP 1/213 (3), and Resistance Management Guidelines were established targeting the most exposed species. These Guidelines are underpinned by the current label recommendations, which recommend either one application of sulfoxaflor in a season or 2 applications with 7-14 days interval avoiding consecutive generations of species, which develop resistance easily. Even in those usages where the probability of resistance development is low only 2 applications are allowed within a season. In addition to these restrictions several recommendations exist on the label like always use the recommended dose rate, rotate different MOA insecticides, consult with local extension specialists, and other control measures to reduce the possibility of the development of resistance.

ZRMS conclusion about possible development of resistance or cross-resistance

There is a risk of resistance development or appearance to sulfoxaflor for aphids *Myzus persicae* and *Aphis gossypii* and for whiteflies *Trialeurodes vaporariorum* and/or *Bemisia tabaci* requiring a monitoring in vegetables and/or ornamentals.
A sensitivity baseline was provided for this 4 species.
A monitoring is requested in Europe for the following target pests.
- *Myzus persicae* in vegetables and/or ornamentals,
- *Aphis gossypii* in cucurbits and/or ornamentals.
- *Trialeurodes vaporariorum* and/or *Bemisia tabaci* in vegetable and/or ornamental crops.

It is up to each cMS to judge about the reliability of these recommendations.
However, the intended interval between applications of 7 days (minimum) is too low. PL proposed to increase this interval to 10-21 days. The interest of 2 applications is to target 2 different pest generations; and to do none consecutive applications, for resistance management.

For the monitoring, the sampling should be realized in representative areas of the crop, where the pests are the most damaging and where the product is used each year (the historic of insecticide treatments of the 3 years before should be provided).

Methods described by IRAC will be accepted. About the number of samples per pest/crop/year, a minimum of 10 populations per year and per pest is recommended (considering the cost and the time needed).

IIIA 6.8 Economics

This is not an EC data requirement / not required by Regulation (EC 1107/2009).

IIIA 6.9 Benefits

SURVEY OF ALTERNATIVE PEST CONTROL MEASURES

This is not an EC data requirement / not required by Regulation (EC 1107/2009).

COMPATIBILITY WITH CURRENT MANAGEMENT PRACTICES INCLUDING IPM

Sulfoxaflor can be adjusted to IPM technologies easily because of its favorable ecotox profile. Our recommendation in IPM technology is:

- Sulfoxaflor has very low toxicity to most predatory mites ("Harmless"). Direct applications of sulfoxaflor are unlikely to effect populations of predatory mites, recovery will occur soon after any minor effects.
- Sulfoxaflor has slight toxicity to predatory insects ("Harmless"-"Slightly Harmful"). Direct application to existing populations may cause an effect on a small number of predatory insect taxa. Effects will be short lived and populations will recover within 1 month.
- Sulfoxaflor is toxic to parasitic wasps when they are directly sprayed but the toxicity decreases over time and generally disappears within 3 weeks after application. Populations of parasitic wasps are likely to recover within 1 to 2 months after application.

The table below, submitted by the petitioner, showed the effects of the product GF-2626 on the most important beneficial organisms, common in open field crops.

Beneficial type	Species/Taxon	IOBC class	Effects on populations and recovery
Predatory mites	*Amblyseius swirskii* *Typhlodromus pyri* *Amblyseius andersoni*	1-2	Populations of predatory mites are unlikely to be affected by applications of sulfoxaflor.
Predatory insects	*Carabidae, Coccinellidae, Staphylininidae, Lycosidae,* and *Linyphiidae*	2-3	In the majority of taxa, sulfoxaflor has only limited effects on populations of predatory insects. Effects on some species of Coleoptera (*Poecilus* sp., Coccinellidae and Tachyporinae are short lived and populations will recover within 1 month.
Parasitic wasps	*Aphidiinae, Braconidae, Eulophidae, Mymaridae, Pteromalidae, Scelionidae and Ichneumonoidae*	3-4	Effects are evident on Hymenoptera parasitoids, however populations recovery typically occurs 1 to 2 months after application

The petitioner added that rotation with other MOA products is recommended if they are selective to beneficial organism.

<u>ZRMS conclusion about the compatibility with current management practices including IPM</u>
Being an insecticide, zRMS believes that the product can affect IPM strategies and reduce some of the beneficial populations: according to applicant data, mites will not be affected whereas predatory insects and predatory wasps must be impacted (futher details are available in section 6 – ecotoxicology).
Following ES comment, Spain ask to the applicant to advice the timing for the application of the product (e.g. a threshold of infestation).

CONTRIBUTION TO RISK REDUCTION

This is not an EC data requirement / not required by Regulation (EC 1107/2009).

IIIA 6.10 Other/special studies

Rainfastness
Two experiments using simulated rain was conducted to determine the rainfast period of GF-2372 (sulfoxaflor 500 g a.s./Kg) and GF-2626 (sulfoxaflor 120 g a.s./L). Bell pepper (Capsicum annuum, L.) plants were treated with 6 and 24 g a.s./ha rates of both sulfoxaflor formulations and a standard product, Provado (imidacloprid). Plants were then subjected to either no rain, or 0.1 inch (2.5 mm) simulated rain at 0.5, 1, 2, 4 hours after insecticide treatment. After drying, plants were infested with green peach aphid (Myzus persicae, Sulzer.) and were incubated in controlled environment. Aphid control was determined three days after application by counting the number of live aphids present on each plant.

Both sulfoxaflor formulations (GF-2372, GF-2626) applied at 24 g a.s./ha rate delivered a high level of aphid control at all time points, while the low rate (6 g a.s./ha) did have variability between the different time points. The overall efficacy was similar for the two sulfoxaflor formulations and both showed some superiority to the standard Provado. Considering the efficacy of sulfoxaflor formulations at the different time points GF-2626 proved to be rainfast even at half an hour rain introduction time, while GF-2372 was rainfast after 1 hour rain introduction time. The results of these two trials support label claims on rainfastness for both GF-2372 and GF-2626 formulations, as a minimum of 1 hour rain free time is required for delivering expected efficacy.

ZRMS conclusion
ZRMS agrees.

IIIA 6.11 Summary and assessment of data according to points 6.1 to 6.7

The table below shows the zRMS conclusions.

Country	**Crops**	**Pests supported in efficacy trials**	**Maximum application rate (L product/ha)**	**Max. number of applications per season**	**zRMS conclusion efficacy section**
All zones (AT, BE, BG, FR, DE, EL, IE, IT, NL, PT, ES, UK, PL)	**Ornamentals** (Flowers and roses, bulbs, trees and shrubs, outdoor and indoor plants)	Aphids: *Aphis gossypii* *Myzus persicae* *Macrosiphum euphorbiae* *Aphis fabae*	0.2 (range 0.1 -0.2)	2	**Acceptable ***
		Whiteflies: *Trialeurodes vaporariorum*	0.2 or 0.4	2 1	**Acceptable ***
		Whiteflies: *Bemisia tabaci*	0.2 or 0.4	2 1	**Acceptable***
All zones (AT, BE, BG, FR, DE, EL, IE, IT, NL, PT, RO, ES, UK, PL)	**Cucurbits** (cucumber, courgette/zucchini, gherkin,melon . pumpkin, squash, watermelon)	Aphids: *Aphis gossypii*	0.2 (range 0.1 -0.2)	2	**Acceptable***
		Whiteflies: *Trialeurodes vaporariorum* *Bemisia tabaci*	0.2 or 0.4	2 1	**Acceptable***
All zones (AT, BE, BG, HR, CY, FR, DE, EL, IE, IT, MA, NL, PT, RO, ES, UK, PL)	**Pepper Aubergine, Tomatoes**	Aphids: *Aphis gossypii* *Myzus persicae*	0.2 (range 0.1 -0.2)	2	**Acceptable***
		Whiteflies: *Trialeurodes vaporariorum* *Bemisia tabaci*	0.2 or 0.4	2 1	**Acceptable***

*To be confirmed at MS level considering:

- Extrapolations possibilities on minor uses and/or pest group,
- The distribution of trials considering the type of greenhouse / glasshouse / tunnels where trials were performed.

Considering the data submitted:

- ✓ The efficacy level of CLOSER is considered as satisfactory for all the claimed uses.
- ✓ The risk of phytotoxicity of CLOSER is considered as negligible for all the claimed uses.
- ✓ The risk of negative impact of CLOSER on yield, quality, propagation, succeeding and adjacent crops are considered as negligible.
- ✓ There is a risk of resistance development or appearance to sulfoxaflor for aphids (*Myzus persicae* and *Aphis gossypii*) and whiteflies (*Trialeurodes vaporariorum* and/or *Bemisia tabaci*) requiring a monitoring in vegetables.

IIIA 6.12 List of test facilities including the corresponding certificates

The list of test facilities including the corresponding certificates is located in the following report: Biological Assessment Dossier for GF-2626 (sulfoxaflor) Protected Uses in the European Union and not repeated here.

List of test facilities including the corresponding certificates
Testing facilities carrying out all trials across southern European countries were GEP approved. Relevant certificates were submitted.

APPENDIX 1: LIST OF DATA SUBMITTED IN SUPPORT OF THE EVALUATION

Referenced section	Author	Report Date	Title	Source	Company Report No.	GLP/GEP Y/N	Published Y/N	Data Protection Claimed Y/N	Owner	Relied on Y/N
IIIA 6.1	S.Webb	2007	IPM Case studies: Cucurbits. in *Aphids as Crop Pests*, ed. by van Emden H and Harrington R.	CABI Wallingford, UK. pp. 639-649		N	Y	N		Y
IIIA 6.1	Luis-Arteaga, M.et al.	1998	Occurrence, Distribution, and Relative Incidence of Mosaic Viruses Infecting Field-Grown Melon in Spain.	Plant Disease 82. pp:979-982		N	Y	N		Y
IIIA 6.1	Tatchell, M.	1989	An estimate of the potential economic losses to some crops to aphids	Crop Protection 8 pp:25-29.		N	Y	N		Y
IIIA 6.1	Rossing, W.RA.H.	1991	Simulation of damage in winter wheat caused by the grain aphid Sitobium avenae. 3. Calculation of damage at various sustainable yield levels.	European Journal of Plant Pathology. 97 pp:87-103.		N	Y	N		Y
IIIA 6.1.1.2	Henderson, C.F Tilton, E.W	1955	Tests with acaricides against the brown wheat mite.	J. Econ. Entomol. 48 , pp. 157–161		N	Y	N		Y
IIIA 6.1.1 IIIA 6.1.1.2 IIIA 6.2.8.7	Abbott, W.S	1925	A method of computing the effectiveness of an insecticide.	J. Econ. Entomol.; 18 : pp:265-267		N	Y	N		Y
IIIA 6.1.1 IIIA 6.2.8.6	Babcock, J.M.et al.	2007	Early stage characterization of XDE-208 in Discovery Insect Biology evaluation programs	Dow AgroSciences	259319	N	N	Y	Dow AgroSciences	Y
IIIA 6.2.8.5	Sparks,T.C. et al.	2012	Differential metabolism of sulfoximine and neonicotinoid insecticides by Drosophila melanogaster monooxygenase CYP6G1	Pesticide Biochemistry and Physiology 103 (2012) 159–165		N	Y	N		Y

IIIA 6.2.8.5	Sparks,T.C. et al.	2013	Mini Review,Sulfoxaflor and the sulfoximine insecticides: Chemistry, mode of action and basis for efficacy on resistant insects	Pesticide Biochemistry and Physiology 107 (2013) 1-7		N	Y	N		Y
IIIA 6.1.1	Davis ,G.E. et al.	2013	Fungicidal Asesement of X11422208 (sulfoxaflor)	Dow AgroSciences		N	Y	N	Dow AgroSciences	Y
IIIA 6.2.8	Bass,C. et al.	2011	Mutation of a nicotinic acetylcholine receptor b subunit is associated with resistance to neonicotinoid insecticides in the aphid Myzus persicae	BMC Neuroscience 2011, 12:51 http://www.biomedcentral.com/1471-2202/12/51		N	Y	N		Y
IIIA 6.2.8	Panini,M. et al.	2013	Detecting the presence of target site resistance to neonicotinoids and pyrethroids in Italian populations of *Myzus persicae*	Correspondence to Emanuele Mazzoni, Institute of Entomology and Plant Pathology, Università Cattolica del Sacro Cuore, Via Emilia Parmense, 84. I-29122 Piacenza, Italy.		N	Y	N		Y
IIIA 6.2.8.6	Longhurst,C et al.	2013	Cross-resistance relationships of the sulfoximine insecticide sulfoxaflor with neonicotinoids and other insecticides in the whiteflies *Bemisia tabaci* and *Trialeurodes vaporariorum*	Accepted article published: 19 October 2012 Published online in Wiley Online Library: 30 November 2012 (wileyonlinelibrary.com) DOI 10.1002/ps.3439		N	Y	N		Y
IIIA 6.2.8.6	Longhurst,C et al.	2014	Cross-resistance relationships of the sulfoximine insecticide sulfoxaflor with pyrethroid, organophosphate, carbamate and neonicotinoid insecticides in the peach-potato aphid *Myzus persicae*.	Dow AgroSciences		N	Y	Y	Dow AgroSciences	Y
IIIA 6.2.8 IIIA 6.2.8.6	Herron,G.A. et al.	2014	Baseline susceptibility and cross-resistance in *Aphis gossypii* Glover (Aphididae:Hemiptera) to phorate and sulfoxaflor	NSW DPI,EMAI,PMB 4008,Narellan,NSW 2567,Australia Austral Entomology (2014) 53,32-35		N	Y	N		Y
IIIA 6.2.8	IRAG	2013	Knock –down resistance (kdr) in Grain Aphids	Insecticide Resistance Action Group ,UK.		N	Y	N		Y

IIIA 6.2.8 IIIA 6.2.8.9	Forster,S.P et al.	2013	Amutation (L1014F) in the voltage-gated sodium channel of the grain aphid, *Sitobion avenae*, is associated with resistance to pyrethroid insecticides	SCI(wileyonlinelibrary.com) DOI 10.1002/ps.3683		N	Y	N		Y
IIIA 6.2.8.7	Hasler,J.M. ; Watson,G.B.	2014	Identification of R81T nAChR beta subunit mutation in field-collected strains of Myzus persicae from southern Europe	Dow AgroSciences		N	Y	Y	Dow AgroSciences	Y
IIIA 6.1.1	Geng, C et al.	2011	Speed of action of Sulfoxaflor on aphid feeding: Inhibition of honeydew production.	Dow AgroSciences	2008723	N	Y	Y	Dow AgroSciences	Y
IIIA 6.1.1	Harrewijn, P.; Kayser, H	1997	Pymetrozine, a fast-acting and selective inhibitor of aphid feeding. In-situ studies with electronic monitoring of feeding behavior	Pesticide Science 49(2), 130-140		N	Y	N		Y
IIIA 6.1.1	Kubiszak, M.E., King, J.E.,	2011	Translaminar activity of sulfoxaflor in laboratory leaf paint bioassays on the green peach aphid Myzus persicae.	Dow AgroSciences		N	Y	Y	Dow AgroSciences	Y
IIIA 6.5.1	Kubiszak, M.E., Mezei, I., King, J.E., Gomez, L.E. and Friar, T.A.,	2014	Residual Activity of Sulfoxaflor in Laboratory Rain Fast Bioassays on the Green Peach Aphid, Myzus persicae	Dow AgroSciences		N	Y	Y	Dow AgroSciences	Y
IIIA 6.1.1.2	Hoffmann,P	2008	XR-208 EFFICACY against aphids in winter barley.	Dow AgroSciences	HU07X03017PH01	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.1.2	Monsour, C. Richards, C.	2010	Comparison of GF-2032 240 SC with Movento 240 SC and Chess 500 WG for the control of cotton aphid (Aphis gossypii) and the prevention of mosaic virus in cucumbers cv. Redlands Long White. Bowen, Queensland, 2010	Dow AgroSciences	2007893	N	N	Y	Dow AgroSciences	Y
IIIA 6.1.4.2		2011	EPPO standards PP 1/243(1): Effects of plant protection products on transformation processes),	European and Mediterranean Plant Protection Organization		N	Y	N		Y
IIIA 6.1.4.2		2000	méthode d'expérimentation pour l'étude des effets non intentionnels des préparations phytopharmaceutiques sur l'élaboration et la qualité du malt et de la biere, 2000, méthode n° 185, 1ÈRE Édition 1996, RÉVISION	French CEB method 185 (quality malt and beer)		N	Y	N		Y
IIIA 6.1.4.2		2004	Méthode d' expérimentation pour l' étude des effets non intentionnels des préparations phytopharmaceutiques sur la qualité du blé tendre et des produits de transformation	French CEB method 218 (quality of soft wheat)		N	Y	N		Y

IIIA 6.1.1	Morita, M.et al.	2007	Flonicamid, a novel insecticide with a rapid inhibitory effect on aphid feeding.	Pest Management Science, 63(10), 969-973		N	Y	N		Y
IIIA 6 IIIA 6.2.8.5	Watson,G. et al.	2011	Novel nicotinic action of the sulfoximine insecticide sulfoxaflor.	Ins Biochem Mol Biol in press		N	Y	N		Y
IIIA 6 IIIA 6.2.8.4	Zhu, Y.et al.	2011	Discovery and Characterization of Sulfoxaflor, a Novel Insecticide Targeting Sap-Feeding Pests.	J Agric Food Chem 59: 2950–2957		N	Y	N		Y
IIIA 6.1.1 IIIA 6.2.7	Schmitzer, P.R Donley, K	2008	Crop safety of XDE-208	Dow AgroSciences	259318	N	N	Y	Dow AgroSciences	Y
IIIA 6.2.7	Rockcliff, C - a	2011	Effects of GF-2626 (sulfoxaflor, 120 g as/L, SC) on the Seedling Emergence of Non Target Terrestrial Plants	Stockbridge Technology Centre Ltd Cawood Selby North Yorkshire, UK YO8 3TZ		Y	N	Y	Dow AgroSciences	Y
IIIA 6.2.7	Rockcliff, C - b	2011	Effects of GF-2622 (sulfoxaflor, 120 g as/L, SC) on the Vegetative Vigour of Non Target Terrestrial Plants.	Stockbridge Technology Centre Ltd Cawood Selby North Yorkshire, UK YO8 3TZ		Y	N	Y	Dow AgroSciences	Y
IIIA 6.2.8.6	Babcock, J.et al.	2011	Biological characterization of sulfoxaflor, a novel insecticide.	Pest Manag Sc. 67: 328–334		N	Y	N		Y
IIIA 6.2.8.5	Daborn, P et al.	2002	A single P450 allele associated with insecticide resistance in Drosophila.	Science 2002, 297, 2253-2256		N	Y	N		Y
IIIA 6.2.8.5	EPPPO	2002	EPPO, Efficacy evaluation of plant protection products – Resistance risk analysis.	PP 1/213(2) pp. 76-93		N	Y	N		Y
IIIA 6.2.8.7	Fereres, A. Torné, M	2009	Lab evaluation of the efficacy of the experimental product “XDE-208” against the green peach aphid and the cotton aphid (2008).	Dow AgroSciences	2001358	Y	N	Y	Dow AgroSciences	Y

IIIA 6.2.8.7	Fereres, A. Torné, M	2011	Evaluation of the efficacy of the experimental product "GF-2032" against the green peach aphid and the cotton aphid (REPORT 2010)	Dow AgroSciences	2008534	Y	N	Y	Dow AgroScience s	Y
IIIA 6.2.8.7	Fereres, A. Torné, M	2013	Evaluation of the activity of GF-2626 against different populations of aphids and whiteflies collected in several parts of Europe (Spain, Italy, France and Greece).	Dow AgroSciences		Y	N	Y	Dow AgroScience s	Y
IIIA 6.2.8.6	Gore, J et al.	2010	Bioassays and management of cotton aphids with neonicotinoids and sulfoxaflor.	Proc Beltwide Cotton Conf 2010, pp 1207-1210		N	Y	N		Y
IIIA 6.2.8.9	Gore,J et al.	2013	Cotton Aphid (Heteroptera: Aphididae) Susceptibility to Commercial and Experimental Insecticides in the Southern United States	Journal of Economic Entomology,Vol.106,no3 (June 2013) pp 1430-1439		N	Y	N		Y
IIIA 6.2.8.6 IIIA 6.2.8.9	Gorman, K.et al.	2006	Whitefly/Aphid Cross Resistance Study Using Dow AgroSciences' Experimental Insecticides at Rothamsted Research, United Kingdom. Stage three report.	Rothamsted Research, United Kingdom. Stage three report	2008457	N	N	Y	Dow AgroScience s	Y
IIIA 6.2.8.6 IIIA 6.2.8.9	Gorman, K.et al.	2010	Activity of XDE208 against multi-resistant Hemipteran pests.	Rothamsted Research, United Kingdom.	2008458	N	N	Y	Dow AgroScience s	Y
IIIA 6	IRAC	2010	IRAC (2010) IRAC MoA Classification Scheme (Version 7.0 October 2010).	http://www.irac-online.org/resources-2/document-library/		N	Y	N		Y
IIIA 6.2.8.5	Jouben,N. et al.	2008	Metabolism of imidacloprid and DDT by P450 CYP6G1 expressed in cell cultures of Nicotiana tabacum suggests detoxification of these insecticides in Cyp6g1-overexpressing strains of Drosophila melanogaster, leading to resistance	Pest. Manag. Sci. 2008, 64, 65-73		N	Y	N		Y
IIIA 6.2.8.5	Gorman, N.et al.	2008	Metabolism of imidacloprid and DDT by P450 CYP6G1 expressed in cell cultures of Nicotiana tabacum suggests detoxification of these insecticides in Cyp6g1-overexpressing strains of Drosophila melanogaster, leading to resistance.	Pest. Manag. Sci. 2008, 64, 65-73		N	Y	N		Y
IIIA 6.2.8.5	Karunker, I.et al.	2008	Over-expression of cytochrome P450 CYP6M1 is associated with high resistance to imidacloprid in the B and Q biotypes of Bemisia tabaci (Hemiptera: Aleyrodidae).	Insect. Biochem. Molec. Biol. 2008, 38, 634-644.		N	Y	N		Y
IIIA 6.2.8.5	Markussen, M.D.K. Kristensen, M	2010	Cytochrome P450 mono-oxygenase-mediated neonicotinoid resistance in the house fly Musca domestica L.	Pesticide Biochemistry and Physiology 98: 50–58		N	Y	N		Y

IIIA 6.2.8.5	Perry, T.et al.	2007	A Da6 knockout strain of Drosophila melanogaster confers a high level of resistance to spinosad	Insect Biochem. Mol.Biol. 37 (2), 184-188.		N	Y	N		Y
IIIA 6 IIIA 6.2.8.5	Perry, T.et al.	2012	Effects of mutations in the Drosophila nicotinic acetylcholine receptor subunits on sensitivity to insecticides targeting nicotinic acetylcholine receptors.	Pesticide Biochemistry and Physiology 102 (2012) 56–60		N	Y	N		Y
IIIA 6.2.8.5	Philippou, D et al.	2010	Metabolic enzyme(s) confer imidacloprid resistance in a clone of Myzus persicae (Sulzer) (Hemiptera: Aphididae) from Greece.	Pest. Manag. Sci. 2010, 66, 390-395.		N	Y	N		Y
IIIA 6.2.8.5	Puinean, A et al.	2010	Characterization of imidacloprid resistance mechanisms in the brown planthopper, Nilaparvata lugens Stål (Hemiptera: Delphacidae)	Pestic. Biochem. Physiol. 2010, 97, 129-132		N	Y	N		Y
IIIA 6.2.8.5	Roditakis, E. et al.	2009	Current status of insecticide resistance in Q biotype Bemisia tabaci populations from Crete.	Pest. Manag. Sci. 2009, 65, 313-322.		N	Y	N		Y
IIIA 6 IIIA 6.2.8.5	Watson, G.B.et al	2010	A spinosyn-sensitive Drosophila melanogaster nicotinic acetylcholine receptor identified through chemically induced target site resistance, resistance gene identification and heterologous expression.	Insect Biochemistry and Molecular Biology 40: 376-384		N	Y	N		Y
IIIA 6.2.8.5	Wen, Y et al.	2009	Imidacloprid resistance and its mechanisms in fleid populations of brown planthopper, Nilaparvata lugens Stål in China.	Pestici. Biochem. Physiol. 2009, 94, 36-42.		N	Y	N		Y
IIIA 6.1.3.1 IIIA 6.2.1	Synthec, France	2008	Efficacy of XDE-208 on aphids in melon and cucumber crops. Europe, 2008.	Dow AgroSciences, France	FR08C1C065CR01	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.3.1 IIIA 6.2.1	Eurofins Portugal	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cucurbits grown outdoors in Portugal?	Dow AgroSciences, Spain	PT08C1C004MT01C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1	Metodos Servicios Agricola, Spain	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cucurbits grown outdoors in Spain?	Dow AgroSciences, Spain	ES08C1C004MT02C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.3.1	Memoli, J.	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Dow AgroSciences, Spain	ES10C1C014JM03	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.1	Fenio, A.	2010	Efficacy and selectivity of sulfoxaflor for the control of aphids in cucurbit crops.	Dow AgroSciences, Italy	IT10C1C014AF01	Y	N	Y	Dow AgroSciences	Y

IIIA 6.1.2.1	Fenio, A.	2010	Efficacy and selectivity of sulfoxaflor for the control of aphids in cucurbit crops	Dow AgroSciences, Italy	IT10C1C014AF02	Y	N	Y	Dow AgroScience s	Y
Erreur ! Source du renvoi introuvab le.	G.Z.Srl, Italy	2010	Efficacy and selectivity of sulfoxaflor for the control of aphids in cucurbit crops	Dow AgroSciences, Italy	IT10C1C014ET01C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1	G.Z.Srl, Italy	2010	Efficacy and selectivity of sulfoxaflor for the control of aphids in cucurbit crops	Dow AgroSciences, Italy	IT10C1C014ET02C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1	G.Z.Srl, Italy	2010	Efficacy and selectivity of sulfoxaflor for the control of aphids in cucurbit crops	Dow AgroSciences, Italy	IT10C1C014ET03C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1	G.Z.Srl, Italy	2010	Efficacy and selectivity of sulfoxaflor for the control of aphids in cucurbit crops	Dow AgroSciences, Italy	IT10C1C014LA01	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1	G.Z.Srl, Italy	2010	Efficacy and selectivity of sulfoxaflor for the control of aphids in cucurbit crops	Dow AgroSciences, Italy	IT10C1C014LA02	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.2.1.1	Carrasco, S.	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Dow AgroSciences, Spain	ES10C1C014SC01	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1	Kerfal, S.	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Dow AgroSciences, Spain	ES10C1C014SK02	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.2.1.1	Melian, J.	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Dow AgroSciences, Spain	ES10C1C014JM01	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1	Memoli, J.	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Dow AgroSciences, Spain	ES10C1C014JM04	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.2.1.1	Metodos Servicios Agricola, Spain	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Metodos Servicios Agricola, Spain	ES10C1C014MT02C	Y	N	Y	Dow AgroScience s	Y

IIIA 6.1.2.1 IIIA 6.2.1.1	Agrofile, Portugal	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Agrofile, Portugal	PT10C1C014MT01C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1	Agrofile, Portugal	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Agrofile, Portugal	PT10C1C014MT02C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1	Agrofile, Portugal	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Agrofile, Portugal	PT10C1C014MT03C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.2.1.1	AgroTecnica del Sur, Spain	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cucurbits grown in greenhouses in Spain?	Dow AgroSciences, Spain	ES08C1C003MT01C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.1.2.1	AgroTecnica del Sur, Spain	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cucurbits grown in greenhouses in Spain?	Dow AgroSciences, Spain	ES08C1C003MT02C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.1.2.1	Staphyt, France	2008	Efficacy of XDE-208 on aphids in melon and cucumber crops. Europe, 2008.	Dow AgroSciences, France	FR08C1C065CR04C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.1.2.1	Melian, J.	2009	What is the efficacy of different sulfoxaflor analogs against aphids on cucurbit crops ?	Dow AgroSciences, Spain	EA09X03002JM01	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.1.2.1	Melian, J.	2009	What is the efficacy of different sulfoxaflor analogs against aphids on cucurbit crops?	Dow AgroSciences, Spain	ES09X03002JM03	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.1.2.1	Alfarano, L.	2009	Efficacy and selectivity of sulfoxaflor analgues against aphids (*Aphis Gossypii/Myzus persicae*) in cucurbit crops.	Dow AgroSciences, Italy	IT09X03002LA01	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.1 IIIA 6.1.2.1	Melian, J.	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Dow AgroSciences, Spain	ES10C1C014JM02	Y	N	Y	Dow AgroScience s	Y

IIIA 6.1.2.1 IIIA 6.2.1.1	Carrasco S.	2010	What is the efficacy of sulfoxaflor (GF-2626) against aphids in cucurbits ?	Dow AgroSciences, Spain	ES10C1C014SK01	Y	N	Y	Dow AgroSciences	Y
IIIA 6.2.1.1	Carrasco, S.	2009	What is the efficacy of different sulfoxaflor analogs against aphids in cucurbits ?	Dow AgroSciences, Spain	ES09X03002SC01	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Torne, M.	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in tomato, pepper and eggplant grown in greenhouses in Spain?	Métodos y Servicios Agrícolas, S.A., Spain	ES08C1C001MT01C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Torne, M.	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in tomato, pepper and eggplant grown in greenhouses in Spain?	Agricultura y Ensayo, S.L., Spain	ES08C1C001MT02C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Torne, M.	2008-2009	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in tomato, pepper and eggplant grown in greenhouses in Spain?	Métodos y Servicios Agrícolas, S.A., Spain	ES08C1C001MT03C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Torné, M.	2008-2009	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in tomato, pepper and eggplant grown in greenhouses in Spain?	Métodos y Servicios Agrícolas, S.A., Spain	ES08C1C001MT04C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Apostolidis, V.	2008	Efficacy of GF-2032 against *Aphiss* spp. on vegetables.	Eufrasia, Greece	GR08C1C057VA01	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Tescari, E.	2008-2009	Efficacy and selectivity of XDE-208 against aphids in tomato	G.Z. S.R.L., Italy	IT08C1C103ET02C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Tescari, E	2008	Efficacy and selectivity of XDE-208 against aphids in pepper.	Proagri S.R.L., Italy	IT08C1C104ET01C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Tescari, E	2008	Efficacy and selectivity of XDE-208 against aphids in pepper.	Proagri S.R.L., Italy	IT08C1C104ET02C	Y	N	Y	Dow AgroSciences	Y

IIIA 6.1.2.2 IIIA 6.2.1.2	Mezei, I.	2008	Efficacy of XDE-208 against aphids in pepper	NTSZ BACS-KISKUN MEGYE, Hungary	HU08C1C125IM03C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Alfarano, L.	2009	Efficacy and selectivity of sulfoxaflor analogues against aphids (*Aphis gossypii / Myzus persicae / Macrosiphium euphorbiae*) in solanaceous crops.	Dow AgroSciences Italia S.r.l.	IT09X03006LA01	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Torne, M.	2010	What is the efficacy and selectivity of sulfoxaflor (GF-2626) on aphids in solanacea crops?	Métodos y Servicios Agrícolas, S.A., Spain	ES10C1C013MT01C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Torne, M.	2010	What is the efficacy and selectivity of sulfoxaflor (GF-2626) on aphids in solanacea crops?	Métodos y Servicios Agrícolas, S.A., Spain	ES10C1C013MT02C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Torne, M.	2010	What is the efficacy and selectivity of sulfoxaflor (GF-2626) against aphids in solanacea crops?	Agricultura y Ensayo, S.L., Spain	ES10C1C014MT01C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Fenio, A.	2010	Efficacy and selectivity of sulfoxaflor for the control of aphids in solanaceous crops.	Dow AgroSciences Italia S.r.l	IT10C1C013AF02	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.2 IIIA 6.2.1.2	Fenio, A.	2010	Efficacy and selectivity of sulfoxaflor for the control of aphids in solanaceous crops.	Dow AgroSciences Italia S.r.l	IT10C1C013AF03	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.3 IIIA 6.2.1.3	Guglielmo Cavalieri	2008	Efficacy and selectivity of XDE-208 against aphids in ornamentals and flowers	Fondazione Minoprio	IT08C1C109ET02C	Y	Y	Y	Dow AgroScience s	Y
IIIA 6.1.2.3 IIIA 6.2.1.3	Cavalieri, Guglielmo	2011	Efficacy and selectivity of sulfoxaflor for the control of aphids in ornamentals	Fondazione Minoprio	IT11C1C007ET01C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.3	Cavalieri, Guglielmo	2011	Efficacy and selectivity of sulfoxaflor for the control of aphids in ornamentals	Fondazione Minoprio	IT11C1C007ET02C	Y	N	Y	Dow AgroScience s	Y

IIIA 6.1.2.3	Bergaglio, Stefano	2011	Efficacy and selectivity of sulfoxaflor for the control of aphids in ornamentals	Anadiag Italy	IT11C1C007ET04C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.3 IIIA 6.2.1.3	Bergaglio, Stefano	2011	Efficacy and selectivity of sulfoxaflor for the control of aphids in ornamentals	Anadiag Italy	IT11C1C007ET06C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.3 IIIA 6.2.1.3	Cavalieri, Guglielmo	2012	What is the efficacy of sulfoxaflor (GF-2626) against aphids in ornamentals	Fondazione Minoprio	IT12C1C013ET02C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.3 IIIA 6.2.1.3	Convertini, Stefano	2012	What is the efficacy of sulfoxaflor (GF-2626) against aphids in ornamentals	Dow AgroSciences, Italy	IT12C1C013ET04C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.3 IIIA 6.2.1.3	Bergaglio, Stefano	2012	What is the efficacy of sulfoxaflor (GF-2626) against aphids in ornamentals	Anadiag Italy	IT12C1C013ET05C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.3 IIIA 6.2.1.3	Cavalieri, Guglielmo	2012	What is the efficacy of sulfoxaflor (GF-2626) against aphids in ornamentals	Fondazione Minoprio	IT12C1C013ET06C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.2.1.3	Vissers, Marc	2008	Gewasveiligheid nieuwe middelen op groot assortiment	Proefcentrum voor sierteelt	BE08C1C196HE01C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4 IIIA 6.2.1.1	Carrasco, Salvador	2007	What is the efficacy of X11422208 on white flies suspected to be resistant to nenicotinoids in vegetables in Spain?	DOW AGROSCIENCES IBERICA S.A., Spain	ES07X03008SC01	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4 IIIA 6.2.1.1	Carrasco, Salvador	2008	Is the efficacy of XDE-208 (GF-2032) to control white fly, enhanced by the mixture of different surfactants? Spain 2008	DOW AGROSCIENCES IBERICA S.A., Spain	ES08C1C176SC01	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4 IIIA 6.2.1.1	Melian, Juan	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) to control white fly in cucumber, zucchini, melon and watermelon in greenhouses in Spain?	DOW AGROSCIENCES IBERICA S.A., Spain	ES08C1C019JM01	Y	N	Y	Dow AgroScience s	Y

IIIA 6.1.2.4 IIIA 6.2.1.1	Melian, Juan	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) to control white fly in cucumber, zucchini, melon and watermelon in greenhouses in Spain?	DOW AGROSCIENCES IBERICA S.A., Spain	ES08C1C019JM02	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4 IIIA 6.2.1.1	Melian, Juan	2009	Efficacy of sulfoxamine analogues against whiteflies (*Trialeurodes vaporariorum/Bemisia tabaci)* in cucurbit crops.	DOW AGROSCIENCES IBERICA S.A., Spain	ES09X03010JM02	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4 IIIA 6.1.3.4	Fraser, John	2009	Efficacy of sulfoxamine analogues against whiteflies (*Trialeurodes vaporariorum/Bemisia tabaci)* in cucurbit crops.	WARWICK HRI, United Kingdom	GB09C1C031JF01	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4	Tescari, Enzo	2011	What is the efficacy of sulfoxaflor (GF-2626) against sap-feeding pests in cucurbit crops?	PROAGRI S.R.L., Italy	IT11C1C015ET01C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4	Tescari, Enzo	2011	What is the efficacy of sulfoxaflor (GF-2626) against sap-feeding pests in cucurbit crops?	G.Z. S.R.L., Italy	IT11C1C015ET02C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4 IIIA 6.1.3.4 IIIA 6.2.1.1	Tescari, Enzo	2013	What is the efficacy of sulfoxaflor (GF-2626) against sap-feeding pests in cucurbit crops?	DOW AGROSCIENCES ITALIA, S.r.l.	IT13C1C097ET02C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4	Torne, Maria	2011	What is the relative activity of sulfoxaflor at 2X 24 gai/ha at 7 days compared to 48 gai/ha applied once against Bemisia tabaci?	METODOS SERVICIOS AGRICOLA S.A., Spain	ES11C1C015MT01C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4	Torne, Maria	2011	What is the relative activity of sulfoxaflor at 2X 24 gai/ha at 7 days compared to 48 gai/ha applied once against Bemisia tabaci?	AGROTECNICA DEL SUR, S.L., Spain	ES11C1C015MT03C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4	Torne, Maria	2011	What is the relative activity of sulfoxaflor at 2X 24 gai/ha at 7 days compared to 48 g a.s./ha applied once against Bemisia tabaci?	AGROTECNICA DEL SUR, S.L., Spain	ES11C1C015MT04C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.4	Lysandrou, Michael	2012	What is the efficacy of sulfoxaflor applied alone or tankmixed with Silwet Gold or Sylgard against whiteflies in cucurbits ?	ELANCO HELLAS SACI. Greece	GR12C1C021ML02C	Y	N	Y	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA	Carrasco, Salvador	2008	What is the efficacy and selectivity of XDE-208 (GF-262) to control white fly in tomato, pepper and eggplant grown in greenhouses in Spain?	Dow AgroSciences Iberica, Spain	ES08C1C017SC01	Y	N	N	Dow AgroScience s	Y

6.2.1.2										
IIIA 6.1.2.5 IIIA 6.2.1.2	Carrasco, Salvador	2008	Is the efficacy of XDE-208 (GF-262) to control white fly, enhanced by the mixture of different surfactants?. Spain 2008.	Dow AgroSciences Iberica, Spain	ES08C1C056SC01	Y	N	N	Dow AgroSciences	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Melian, Juan	2008	Is the efficacy of XDE-208 (GF-262) to control white fly, enhanced by the mixture of different surfactants?. Spain 2008.	Dow AgroSciences Iberica, Spain	ES08C1C176JM01	Y	N	N	Dow AgroSciences	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Torne, María	2009	Efficacy of sulfoximine analogues against whiteflies (*Trialeurodes vaporariorum/Bemisia tabaci*) in solanaceous crops	Dow AgroSciences Iberica, Spain	ES09X03009RA03	Y	N	N	Dow AgroSciences	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Melian, Juan	2011	What is the relative activity of sulfoxaflor at 2x 24 g a.s./ha at 7 days compared to 48 g a.s./ha applied once against *Bemisia tabaci*?.	Dow AgroSciences Iberica, Spain	ES11C1C014JM01	Y	N	N	Dow AgroSciences	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Torne, María	2011	What is the relative activity of sulfoxaflor at 2x 24 gai/ha at 7 days compared to 48 g a.s./ha applied once against *Bemisia tabaci*?.	Charles River Laboratories, Spain	ES11C1C014MT01C	Y	N	N	Dow AgroSciences	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Alfarano, Luigi	2007	Efficacy of X11422208 against whiteflies in vegetables.	Dow AgroSciences Italia S.r.l., Italy	IT07C1C009LA01	Y	N	N	Dow AgroSciences	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Fenio, Antonio	2008	Efficacy and selectivity of XDE-208 against whiteflies in tomato.	Dow AgroSciences Italia S.r.l., Italy	IT08C1C114AF01	Y	N	N	Dow AgroSciences	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Fenio, Antonio	2009	Efficacy and selectivity of sulfoxaflor analogues against whiteflies in solanaceous crops.	Dow AgroSciences Italia S.r.l., Italy	IT09X03009AF01	Y	N	N	Dow AgroSciences	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Fenio, Antonio	2009	Efficacy and selectivity of sulfoxaflor analogues against whiteflies in solanaceous crops.	Dow AgroSciences Italia S.r.l., Italy	IT09X03009AF02	Y	N	N	Dow AgroSciences	Y

IIIA 6.1.2.5 IIIA 6.2.1.2	Tescari, Enzo	2011	What is the efficacy of sulfoxaflor (GF-2626) against sap feeding pests in solanaceous crops?.	Proagri, S.R.L., Italy	IT11C1C014ET01C	Y	N	N	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Tescari, Enzo	2011	What is the efficacy of sulfoxaflor (GF-2626) against sap feeding pests in solanaceous crops?.	Agrobiocontrol, Italy	IT11C1C014ET02C	Y	N	N	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Alfarano, Luigi	2011	What is the efficacy of sulfoxaflor (GF-262) against sap feeding pests in solanaceous crops?	Dow AgroSciences Italia S.r.l., Italy	IT11C1C014LA01	Y	N	N	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Mavrotas, Costas	2010	Activity of 2x24 g a.s./ha of sulfoxaflor at 7 days compared to 48 g a.s./ha applied once against whiteflies in vegetable crops	Elanco Hellas SACI, Greece	GR10C1C017CM01C	Y	N	N	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Mavrotas, Costas	2010	Efficacy of GF-2626 against whiteflies in tomatoes.	Elanco Hellas SACI, Greece	GR10C1C051CM01C	Y	N	N	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Apostolidis, Vasilis	2012	What is the efficacy of sulfoxaflor applied alone or tank mixed with silwet gold or sylgard against whiteflies in solanaceous crops?	Dow AgroSciences Export S.A.S., Greece	GR12C1C022VA01	Y	N	N	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Apostolidis, Vasilis	2012	What is the efficacy of sulfoxaflor applied alone or tank mixed with silwet gold or codacide against whiteflies in solanaceous crops?	Dow AgroSciences Export S.A.S., Greece	GR12C1C059VA01	Y	N	N	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Fenio, Antonio	2007	Efficacy of X11422208 against flies in vegetables.	Dow AgroSciences Italia S.r.l., Italy	IT07C1C009AF01	Y	N	N	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA 6.2.1.2	Fenio, Antonio	2008	Efficacy and selectivity of XDE-208 alone and in mix with adjuvants against whiteflies in tomato.	Dow AgroSciences Italia S.r.l., Italy	IT08C1C137AF02	Y	N	N	Dow AgroScience s	Y
IIIA 6.1.2.5 IIIA	Fenio, Antonio	2011	What is the efficacy of sulfoxaflor (GF-2626) against sap feeding pests in solanaceous crops?	Dow AgroSciences Italia S.r.l., Italy	IT11C1C014AF01	Y	N	N	Dow AgroScience s	Y

6.2.1.2										
IIIA 6.1.2.5 IIIA 6.2.1.2	Fenio, Antonio	2012	What is the efficacy of sulfoxaflor (GF-2626) against sap feeding pests in solanaceous crops?	Dow AgroSciences Italia S.r.l., Italy	IT12C1C022AF01	Y	N	N	Dow AgroSciences	Y
IIIA 6.1.2.6 IIIA 6.2.1.3	Cavalieri, Guglielmo	2008	Efficacy and selectivity of XDE-208 against whiteflies in ornamentals and flowers	Fondazione Minoprio	IT08C1C115ET01C	Y	Y	Y	Dow AgroSciences	Y
IIIA 6.1.2.6 IIIA 6.2.1.3	Cavalieri, Guglielmo	2008	Efficacy and selectivity of XDE-208 against whiteflies in ornamentals and flowers	Fondazione Minoprio	IT08C1C118ET02C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.6 IIIA 6.2.1.3	Alfarano, Luigi	2012	What is the efficacy of sulfoxaflor (GF-2626) against sap feeding pests in (solanaceous) ornamental crops?	Dow AgroSciences Italy	IT12C1C022LA01	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.6	Cavalieri, Guglielmo	2013	What is the selectivity and efficacy of sulfoxaflor against whiteflies in ornamentals?	Fondazione Minoprio	IT13C1C098ET01C	Y	N	Y	Dow AgroSciences	Y
IIIA 6.1.2.6	Cavalieri, Guglielmo	2013	What is the selectivity and efficacy of sulfoxaflor against whiteflies in ornamentals?	Fondazione Minoprio	IT13C1C098ET02C	Y	N	Y	Dow AgroSciences	Y
IIIA1 6.1.4.2	D. Barnabe	2010	Taint test of sulfoxaflor (GF-2626) on cucurbits fruits(cucumber) cultivated under greenhouse, field and lab phases, Italy 2010.	AGRI 2000 Soc. Coop. - Bologna	IT10C1C047ET01C	Y	N	Y	Dow AgroSciences	Y
IIIA1 6.1.4.2	D. Barnabe	2010	Taint test of sulfoxaflor (GF-2626) on solanaceous fruits (tomato) cultivated under greenhouse, field and lab phases, Italy 2010.	AGRI 2000 Soc. Coop. - Bologna	IT10C1C053ET01C	Y	N	Y	Dow AgroSciences	Y

List of data submitted in support of the evaluation

ZRMS relied on all provided studies.

APPENDIX 2: GAP TABLE(S) CHECKED BY ZRMS

Intended uses for GF-2626 in protected crops

**GAP rev. 02,
date: 2014-Nov-28**

PPP (product name/code)	**GF-2626**	**Formulation type:**	**SC**
active substance 1	**sulfoxaflor**	**Conc. of as 1:**	**120 g/L**
safener NA		**Conc. of safener:**	NA
synergist NA		**Conc. of synergist:**	NA
Applicant:	**Dow AgroSciences**	**professional use**	**Y**
Zone(s): All zones, protected		**non-professional use**	N
Verified by MS:	**yes in July 2017**		

1	2	3	4	5	6	7	8	10	11	12	13	14
					Application			**Application rate**				
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** (additionally: developmental stages of the pest or pest group)	Method / Kind	Timing / Growth stage of crop & season	Max. number (min. interval between applications) a) per use b) per crop/ season	kg, L product / ha a) max. rate per appl. b) max. total rate per crop/season	g as/ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha min / max	**PHI** (days)	**Remarks:** e.g. safener/synergist per ha e.g. recommended or mandatory tank mixtures
1a	All zones (AT, BE, BG, HR, CY, FR, DE, EL, IE, IT, MA, NL, PT, RO, ES, UK, PL)	Aubergines (incl. Pepinos)	G	~~Aphids (all stages),~~ Whiteflies (all stages)	Ground applied foliar spray, broadcast	BBCH 20-87 All year	a) 1 b) 1 or a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.4 b) 0.4 or a) 0.2 b) 0.4	a) 48 b) 48 or a) 24 b) 48	500 - 1500	1	Whiteflies: Either two applications of 24 g a.s./ha with a minimum 7 days interval or only one application of 48 g a.s./ha.
1b	All zones (AT, BE, BG, HR, CY, FR, DE, EL, IE, IT, MA, NL, PT, RO, ES, UK, PL)	Aubergines (incl. Pepinos)	G	Aphids (all stages)	Ground applied foliar spray, broadcast	BBCH 20-87 All year	a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.2 b) 0.4	a) 24 b) 48	500 - 1500	1	Aphids: One or two applications of 24 g a.s./ha. Two applications would be minimum 7 days interval.

2a	All zones (AT, BE, BG, FR, DE, EL, IE, IT, NL, PT, ES, UK, PL)	Ornamentals (Flowers and roses, bulbs, trees and shrubs, outdoor and indoor plants)*	G	~~Aphids (all stages),~~ Whiteflies (all stages)	Ground applied foliar spray, broadcast	BBCH 12-59 All year	a) 1 b) 1 or a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.4 b) 0.4 or a) 0.2 b) 0.4	a) 48 b) 48 or a) 24 b) 48	200 - 2000	1	<u>Whiteflies</u>: Either two applications of 24 g a.s./ha with a minimum 7 days interval or only one application of 48 g a.s./ha. ***for France, outdoor and indoor ornamentals plants are not considered as professional use.**
2b	All zones (AT, BE, BG, FR, DE, EL, IE, IT, NL, PT, ES, UK, PL)	Ornamentals (Flowers and roses, bulbs, trees and shrubs, outdoor and indoor plants)*	G	Aphids (all stages)	Ground applied foliar spray, broadcast	BBCH 12-59 All year	a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.2 b) 0.4	a) 24 b) 48	200 - 2000	1	<u>Aphids</u>: One or two applications of 24 g a.s./ha. Two applications would be minimum 7 days interval. ***for France, outdoor and indoor ornamentals plants are not considered as professional use.**
3a	All zones (AT, BE, BG, FR, DE, EL, IE, IT, NL, PT, RO, ES, UK, PL)	Cucurbits (edible peel – cucumbers, zucchini, gherkins; inedible peel – melons, pumpkins/ squash, ~~Zuccini,~~ watermelons)	G	~~Aphids (all stages),~~ Whiteflies (all stages)	Ground applied foliar spray, broadcast	BBCH 20-87 All year	a) 1 b) 1 or a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.4 b) 0.4 or a) 0.2 b) 0.4	a) 48 b) 48 or a) 24 b) 48	500 - 1500	1	<u>Whiteflies</u>: Either two applications of 24 g a.s./ha with a minimum 7 days interval or only one application of 48 g a.s./ha.
3b	All zones (AT, BE, BG, FR, DE, EL, IE, IT, NL, PT, RO, ES, UK, PL)	Cucurbits (edible peel – cucumbers, zucchini, gherkins; inedible peel – melons, pumpkins/ squash, ~~Zuccini,~~ watermelons)	G	Aphids (all stages)	Ground applied foliar spray, broadcast	BBCH 20-87 All year	a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.2 b) 0.4	a) 24 b) 48	500 - 1500	1	<u>Aphids</u>: One or two applications of 24 g a.s./ha. Two applications would be minimum 7 days interval.

4a	All zones (AT, BE, BG, HR, CY, FR, DE, EL, IE, IT, MA, NL, PT, RO, ES, UK, PL)	Pepper (incl. Chilli pepper)	G	~~Aphids (all stages),~~ Whiteflies (all stages)	Ground applied foliar spray, broadcast	BBCH 20-87 All year	a) 1 b) 1 or a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.4 b) 0.4 or a) 0.2 b) 0.4	a) 48 b) 48 or a) 24 b) 48	500 - 1500	1	<u>Whiteflies</u>: Either two applications of 24 g a.s./ha with a minimum 7 days interval or only one application of 48 g a.s./ha.
4b	All zones (AT, BE, BG, HR, CY, FR, DE, EL, IE, IT, MA, NL, PT, RO, ES, UK, PL)	Pepper (incl. Chilli pepper)	G	Aphids (all stages)	Ground applied foliar spray, broadcast	BBCH 20-87 All year	a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.2 b) 0.4	a) 24 b) 48	500 - 1500	1	<u>Aphids</u>: One or two applications of 24 g a.s./ha. Two applications would be minimum 7 days interval.
5a	All zones (AT, BE, BG, HR, CY, FR, DE, EL, IE, IT, MA, NL, PT, RO, ES, UK, PL)	Tomatoes	G	~~Aphids (all stages),~~ Whiteflies (all stages)	Ground applied foliar spray, broadcast	BBCH 20-87 All year	a) 1 b) 1 or a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.4 b) 0.4 or a) 0.2 b) 0.4	a) 48 b) 48 or a) 24 b) 48	500 - 1500	1	<u>Whiteflies</u>: Either two applications of 24 g a.s./ha with a minimum 7 days interval or only one application of 48 g a.s./ha.
5c	All zones (AT, BE, BG, HR, CY, FR, DE, EL, IE, IT, MA, NL, PT, RO, ES, UK, PL)	Tomatoes	G	Aphids (all stages)	Ground applied foliar spray, broadcast	BBCH 20-87 All year	a) ~~1~~ 2 b) 2 (7 days min. interval)	a) 0.2 b) 0.4	a) 24 b) 48	500 - 1500	1	<u>Aphids</u>: One or two applications of 24 g a.s./ha. Two applications would be minimum 7 days interval.