REGISTRATION REPORT

Part B
Section 7: Efficacy Data and Information

Detailed summary of the risk assessment

TRANSFORM (GF-2372)

500 g/Kg Sulfoxaflor

Southern Zone

Zonal Rapporteur Member State: France

CORE ASSESSMENT

Applicant: DOW AgroSciences

Date: October 2017

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IIIA 6.1 EFFICACY DATA AND INFORMATION (INCLUDING VALUE DATA) ON THE PLANT PROTECTION PRODUCT

This document was evaluated and commented by zRMS France. Conclusions are displayed in commenting boxes (like this one). This RR is a validation by the zRMS of the dRR written and supplied by the applicant. At the end of each chapter, a commenting box has been formulated by the zRMS.

Text in yellow was submitted by the applicant following the request of Anses for further efficacy data.

GF-2372 contains the active substance sulfoxaflor (500 g a.s./kg), 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.

GF-2372 is intended to control aphids in cereals, oilseed rape and cotton.

The table below shows the uses claimed by the petitioner and indicates the dose rate and number of applications per use.

Modifications following the comments phase were highlighted in orange.

Country	**Crops**	**Pests**	**Maximum application rate**	**Maximum number of applications per season**
Southern zone (EL)	Cotton	Aphids	0.048 kg/ha (24 g sulfoxaflor/ha)	2
Southern zone (FR)	Oilseed rape	Aphids	0.048 kg/ha (24 g sulfoxaflor/ha)	2
Southern zone (FR, IT)	Cereals	Aphids	0.048 kg/ha (24 g sulfoxaflor/ha)	2

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-2372 containing the new active ingredient sulfoxaflor to be used in field condition in cereal, oilseed rape and cotton crops in the Southern EU regulation 1107/2009 zone. The zonal RMS will conduct the evaluation of the dossier.

This current submission is for one of the representative formulations, GF-2372 (500 g a.s./kg WG). 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 the biological dossier 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-2372 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 intend to support the label claims for sulfoxaflor for the control of a aphids in cereal, oilseed rape and cotton crops in the Southern EU regulation 1107/2009 zone 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-2372 (sulfoxaflor) Field Uses in the EU Regulatory Southern Zone.

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

IIIA 6.2 EFFICACY DATA

This draft registration report aims to demonstrate that GF-2372 deliver high level of control of aphids in cereal, cotton and oilseed rape crops, all grown in field conditions and comparable to main competitor insecticides used in the European Union regulatory Southern zone.

The formulation of sulfoxaflor proposed for the use in cereal, cotton and oilseed rape crops is GF-2372 (500 g a.s./kg WG) but, before 2010 another formulation - GF-2032 (240 g a.s./L, SC) – was used exclusively in the trials. In order to create a robust database using all available data from the 2 formulations, an assessment was done on the comparability of the 2 sulfoxaflor formulations. The efficacy results from the comparability trials showed biological equivalency of GF-2372 (500 g a.s./kg WG) and GF-2032 (240 g a.s./L, SC) at the compared dose rates of 12 g a.s./ha and 24 g a.s./ha proved 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

CEREALS are the most important staple crops in the European Union with 2012 production at ~284.3 milion tonnes. 39 % (111.9 million tonnes) of this production was produced in the EU regulatory South Zone on 28 million hectares cultivated for cerelas including winter and spring cereals. In terms of quantity and area, wheat is by far the most popular cereal grown in the EU, making more than the half the total. The other big crop is barley while other cereals grown in smaller quantities include triticale, rye, oats and spelt.

Aphids cause both direct and indirect damage to cereals; direct damage is mediated through feeding on the phloem sap which reduces the transport of phloem to storage sites such as the grains (Poehling *et al*. 2007). Yield loss occurs primarily because of loss of phloem sap and excretion of honeydew which occludes the stomata and can lead to secondary fungal infections reducing the photosynthetic efficacy of the plants. Aphid infestations also spoil the baking quality of grains by inducing changes in protein composition. Indirect damage to cereals is primarily through the transmission of viruses such as Barley Yellow Dwarf Virus (BYDV) and Cereal Yellow Dwarf Virus. Primary infection is in the autumn on winter planted barley and wheat but spring and summer in-field secondary spread can be important.

Sitobion avenae (MACSAV), ***Metopolophium dirhodum*** *(*METODR), ***Rhopalosiphum padi*** (RHOPPA) and ***Schizaphis graminum*** (TOXOGR) are the dominant aphid species feeding on cereals in Europe. Sometimes they occur all together on the crop living on different parts of the plant. *Sitobion avenae* and *Rhopalosiphum padi* are feeding on the upper parts, *Metopolophium dirhodum* lives on the lower leaves and the stem.The grain aphid (*Sitobion avenae,* MACSAV) is a major pest on wheat and a moderate pest on barley and oats. It causes direct feeding damage mainly through May to June, from the flag leaf to milk ripeness This species also has pest status in winter-sown cereals in September/October, and throughout mild winters, as a virus vector of Barley yellow dwarf virus. Direct feeding injury arising from grain aphid attacks on the ears can lead to loss in grain yield and flour quality can be adversely affected in bread making wheat varieties.Other cereal aphids that occur in the summer months are the rose grain aphid (*Metopolophium dirhodum*) and the bird-cherry aphid (*Rhopalosiphum padi*). *M. dirhodum* (METODR) hibernates at the egg stage and winged forms appear end of April or beginning of May. The aphids feed mainly on the under surface of the leaves, hence they are difficult targets for insecticides.

Rhopalosiphum padi (RHOPPA) is a major carrier of barley yellow dwarf virus (BYDV) which can cause yellowing, stunting, suppressed heading and yield decrease.

OILSEED RAPE (winter and spring) crops are important in the European Union with 2010 production at ~28.95 million tonnes; 44.4% (12.85 million tonnes) of this production was produced in the EU regulatory Southern zone.

There are two major **aphid** species which cause damage to oilseed rape. ***Brevicoryne brassicae*** (L.) is the dominant species, which is exclusive to brassica crops. The major attack occurs in spring and early summer time sometimes at the flowering-ripening stage of oilseed rape. If the infestation is high, colonies can cause significant yield decrease and plant shrivelling. Autumn infestations could give similar feeding damage to ***Myzus persicae***. Mild winters can allow infestations on winter oilseed rape to increase to damaging levels on later infestations which move on to developing flowers and pods. *Myzus persicae* is a major pest also to several other crops including brassicas, potatoes, peach, lettuce, sugarbeet and ornamentals. This is the main vector of TuYV (*Turnip yellows virus,* up to 30% of aphids could be carrying the virus) which can decrease yields by up to 30% and is most damaging when young plants are infested in the autumn. This aphid generally migrates into oilseed rape crops during late summer and autumn and will continue to spread into winter if temperatures remain mild (HGCA Publications, 2012). Several other viruses could be transmitted by this species on oilseed rape as B.W.Y.V. (*Beet Western Yellowing Virus*), Ca.M. V. (*Cauliflower Mosaïc Virus*) and Turnip yellows virus (Stevens *et al*., 2008). Direct feeding damage could occur if the pest pressure is high and the infestation is early. The plant growth is decreased and leaves are deformed (French CEB method 191). The threshold in autumn is 20% of plants infested by *Myzus persicae* and 2 colonies per square meter for spring *Brevicoryne brassicae* attack.

COTTON is an arable crop used mainly for its fibre. Currently, cotton is produced only in 3 Member States in EU on around 300 000 ha. Greece is the main cotton grower, with 80% of European cotton area, followed by Spain (mainly the region of Andalucía) with a share of 20%. Bulgaria produces cotton on less than 1 000 ha. Cotton production has ceased in Italy in 1991 and in Portugal in 1996. Although cotton represents less than 0.2% of the value of European agricultural production, it has strong regional importance in the two main producing Member States. With 230 000 t, Greece accounts for 85% of EU production, whereas Spain produces the remaining 15% (40 000 t).

The main **aphid** species attacking cotton in the European Union is ***Aphis gossypii***, the cotton or melon aphid (APHIGO). *Aphis gossypii* causes three types of damage to cotton, each can be significant. They spread virus diseases, cause damage through the removal of sap and damage the cotton fibre by contamination with honeydew which encourages the growth of moulds. The adults and nymphs of the cotton aphid feed on the underside of leaves or on the growing tips of shoots, sucking juices from the plant. The foliage may become chlorotic and die prematurely. There is often a great deal of leaf curling and distortion which hinders efficient photosynthesis. Honeydew is excreted by the aphids and this allows sooty moulds to grow, resulting in a decrease in the quantity and quality of the produce. The aphids are very polyphagus having about 700 host plants worldwide including cotton, which gave the common name.

IIIA 6.3 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-emergence herbicidal activity of sulfoxaflor across a range of crop and weed species. Sulfoxaflor was applied at various rates up to 4,500 and 150 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 fifteen dicotyledon species (Soybean, Oilseed rape, Cabbage, Tomato, Lettuce, Carrot, Sugar beet, Cotton, Sunflower and Cucumber crops and Velvetleaf, Pigweed, Lambsquarter, Wild poinsettia and Ivyleaf morningglory 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-emergence herbicidal activity of sulfoxaflor across a range of crop and weed species. Sulfoxaflor was applied in various rates up to 400 and 150 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-emergent 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

Preliminary laboratory trials:

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.

Preliminary field trials:

In 2006, two preliminary field trials were set up on cereals to evaluate the efficacy of sulfoxaflor against aphids and to compare the performance with current reference actives. One trial was set up on winter wheat and one trial on common oat. The main pest species in both trials was the English grain aphid (*Sitobion avenae*; MACSAV). One spring application was carried out at cereal development stage BBCH 65 - 83. Sulfoxaflor was tested at dose rates between 25 g a.s./ha and 100 g a.s./ha. No significant difference was observed between the treatments, sulfoxaflor even at the lowest dose rate of 25 g a.s./ha was comparable to the commercial standards (acetamiprid, thiametoxam and lambda-cyhalothrin) delivering sufficient knock down and residual efficacy.

In another trial where virus transmission was tested the reduction in severity of virus symptoms translated into a yield increase with plots of winter barley treated with 25 g a.s./ha of sulfoxaflor producing a yield of 5.072 tonnes/ha compared with 1.860 tonnes/ha in the untreated controls.

In 2006, two preliminary field trials were set up on oilseed rape to evaluate the efficacy of sulfoxaflor against aphids and to compare the performance with current reference actives. Both trials were set up on winter oilseed rape. One trial was set up in spring on *Brevicoryne brassicae* and one trial in autumn on *Myzus persicae*. One autumn or spring application was carried out at the development stage BBCH 12-14 or 76-80. Sulfoxaflor was tested at dose rates between 12.5 g a.s./ha and 100 g a.s./ha. No significant difference was observed between the treatments, sulfoxaflor even at the lowest dose rate of 25 g a.s./ha was comparable to commercial standards delivering sufficient knock down and residual efficacy on both aphid species in oilseed rape.

One field trial was set up in 2006 to evaluate the efficacy of sulfoxaflor applied at various rates against aphids in cotton and to compare the performance with current standard reference actives. The trial was set up in Thessaloniki, Greece by the Dow AgroSciences Field Station. This early stage plot field screening trial, clearly showed that sulfoxaflor provided very good activity (>90% control) at all tested rates 12.5, 25, 37.5 50 g a.s./ha on APHIGO at 2-7 days after application being comparable to the reference neonicotinoid product, acetamiprid applied at 75 g a.s./ha.

In another trial cotton aphids' virus transmission was tested in cucumber where cucumber mosaic virus (CMV) and papaya ring spot virus (PRSV) infection was evaluated in the different treatments. All insecticide treatments significantly reduced the incidence of cucumber mosaic virus (CMV) and papaya ring spot virus (PRSV) compared with the untreated control. There was no significant difference in the incidence of CMV and PRSV for rates of 24, 48, 72, 96 and 144 g a.s./ha of sulfoxaflor at 7DAA1. The incidence of CMV and PRSV for sulfoxaflor at 24, 48, 72, 96 and 144 g a.s./ha was equivalent to spirotetramat plus Hasten and significantly lower than that of pymetrozine at 7 DAA1.

In the preliminary trials sulfoxaflor did not produce any visual injuries or phytotoxic effects on the crop during the duration of the trials. Based on data from the laboratory and field trial results it can be concluded that sulfoxaflor at the proposed label rate (24 a.s./ha) has high potency against aphids without significant impact on the nematodes or insects in the orders of *Coleoptera, Lepidoptera, Diptera*.

ZRMS conclusion about preliminary range-finding tests

The laboratory and field trials showed that the sulfoxaflor had an interesting control against aphids at the claimed dose rate of 24 g sulfoxaflor/ha.

IIIA 6.4 MINIMUM EFFECTIVE DOSE TESTS

Aphid control in cereals

A cross-zonal approach, using data from France (7 trials), Portugal (1 trial), Spain (5 trials), Italy (2 trials), Czech Republic (1 trial), Germany (1 trial), Hungary (2 trials), and the United Kingdom (1 trial) was used to determine the minimum effective dose rate for sulfoxaflor against aphids in cereals. Between 2007 and 2012, 13 trials set up in spring and seven in autumn tested the efficacy of various rates (6- 24 g a.s./ha) of sulfoxaflor, in accordance with the EPPO standard PP 1/225 '*Minimum effective dose'*. All the spring trials were set up in the Southern EU regulation 1107/2009 zone taking data from both EPPO climatic zones (Mediterranean and Maritime). The autumn trials were set up in the Southern and Central EU regulation 1107/2009 zones in EPPO climatic zones of Mediterranean, Maritime and South East as described in EPPO standard PP 1/241. The Central zone data were used in order to enhance the available data base and because winter cereals in the relevant countries are generally planted in similar climatic and agronomic conditions. 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 1/20, etc.). Efficacy was tested under a wide range of environmental conditions to fully challenge the product. All 20 trials did have sufficient level of natural infestation of aphids to obtain reliable results (5-50 aphids/plant or ear). Spray volume ranged from 200 to 600 L/ha. Trials were set up on winter barley (8) and winter wheat (12) at their growth stages of 1 leaf to mid tillering (BBCH 11-23) in autumn, or between BBCH 55 and 85 in spring against *Rhopalosiphum padi* (RHOPPA) and *Sitobion avenae* (MACSAV). In 3 autumn trials, where symptoms of barley yellow dwarf virus (BYDV) appeared, the intensity of virus infection was also assessed by measuring the intensity of symptoms via visual evaluation and the yield was also measured at harvest.

Sulfoxaflor showed a dose response against both *Rhopalosiphum padi* and *Sitobion avenae*, reaching a plateau at 24 g a.s./ha rate, which delivered the most robust results across assessments providing sufficient knock down and long term residual control (**Table 6.4-1**, **Table 6.4-2**). The efficacy was slightly better in the spring trials than in the autumn trials with no significant difference between the 2 tested species. A reduction of the dose rate below 24 g a.s./ha increased the variation and decreased the average efficacy levels.

Table 6.4-1 Efficacy of sulfoxaflor against *Rhopalosiphum padi* (RHOPPA) and *Sitobion avenae* (MACSAV) in autumn cereal trials.

Days after application	Efficacy of sulfoxaflor in % on *Rhopalosiphum padi* (RHOPPA) and *Sitobion avenae* (MACSAV) in autumn cereal trials											
	6 g a.s. /ha			12 g a.s. /ha			18 g a.s. /ha			24-25 g a.s. /ha		
	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials
RHOPPA 2-3 DAA	**49.7**	(37.5-74.7)	5	**69.5**	(42.0-81.9)	5	**60.2**	(43.1-74.7)	5	**65.5**	(44.4-78)	5
RHOPPA 6-8 DAA	**63.3**	(41.4-84.7)	5	**76.0**	(49.6-95.5)	5	**76.6**	(56.0-94.1)	5	**84.5**	(58.2-100)	5
RHOPPA 12-14 DAA	**69.5**	(30.6-95.1)	5	**84.3**	(73.5-97.3)	5	**86.4**	(75-100)	5	**87.4**	(70.9-100)	5
MACSAV 2-3 DAA	**45.5**	(41.6-49.3)	2	**45.3**	(43.3-47.2)	2	**50.4**	(40-60.7)	2	**59.0**	(53.9-64.1)	2
MACSAV 6-8 DAA	**59.1**	(43.1-75.1)	2	**68.7**	(54.8-82.5)	2	**61.4**	(36.8-86.0)	2	**80.6**	(74.5-86.6)	2
MACSAV 12-14 DAA	**53.3**	(34.2-72.3)	2	**60.5**	(48.3-72.7)	2	**60.7**	(36.3-85.1)	2	**64.6**	(45-84.1)	2

Table 6.4-2 Efficacy of sulfoxaflor against *Rhopalosiphum padi* (RHOPPA) and *Sitobion avenae* (MACSAV) in spring cereal trials.

Days after application	Efficacy of sulfoxaflor in % on *Rhopalosiphum padi* (RHOPPA) and *Sitobion avenae* (MACSAV) in spring cereal trials			
	6 g a.s. /ha	12 g a.s. /ha	18 g a.s. /ha	24 g a.s. /ha

	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials
RHOPPA 2-3 DAA	**61.0**	(43.7-69.2)	6	**78.1**	(61-95.9)	6	**76.8**	(63.8-97.5)	6	**82.6**	(76.9-96)	6
RHOPPA 6-8 DAA	**70.3**	(62.6-76.8)	6	**84.7**	(79.2-95)	6	**84.0**	(76.6-98.3)	6	**86.8**	(81-100)	6
RHOPPA 12-14 DAA	**72.4**	(64.6-79.9)	5	**86.7**	(71.2-97.8)	5	**91.6**	(83.7-100)	5	**92.2**	(86.4-100)	5
MACSAV 2-3 DAA	**57.8**	(34.2-84.5)	6				**74.6**	(65.5-90)	6	**80.7**	(61.4-92.2)	6
MACSAV 6-8 DAA	**67.7**	(46.4-92.4)	6				**92.3**	(86.5-96.3)	6	**93.4**	(79.2-100)	6
MACSAV 12-14 DAA	**75.8**	(44.1-93.4)	5				**93.7**	(90.1-97)	5	**97.1**	(91.9-100)	5

In the 3 autumn trials, where barley yellow dwarf virus appeared, both 12 and 24 g a.s./ha rates of sulfoxaflor decreased the virus infection level significantly and showed a dose response between 12 and 24 g a.s./ha, especially when the infection level was high in the untreated. There were significant differences in the yield between the treated and untreated plots.

In summary, data presented from 20 trials, conducted mainly in the EU regulatory Southern zone, demonstrated the minimum effective dose rate to be 24 g a.s./ha against aphids in cereals applied either in the autumn or spring. This rate was confirmed in the EU regulatory Central zone as well (Mezei and Harris, 2014).

ZRMS conclusion: Aphid control in cereals

The results obtained in cereals (spring and autumn) against *Rhopalosiphum padi* (RHOPPA) and *Sitobion avenae* (MACSAV) showed that the claimed dose rate of 24 g sulfoxaflor/ha can be considered as the minimum effective dose for the control of aphids in cereals.

This conclusion is drawn for France and Italy, as known cMS.

In case of a future mutual recognition in other MS of the southern zone, a summary of efficacy data carried out in the Mediterranean EPPO zone (15 trials) should be provided.

Aphid control in oilseed rape

A cross-zonal approach, using data from France (4 trials) and the United Kingdom (2 trials) was used to determine the minimum effective dose rate of sulfoxaflor against aphids, *Brevicoryne brassicae* (BRVCBR) and *Myzus persicae (* MYZUPE), in oilseed rape. Three trials set up in spring and three in autumn tested several dose rates of sulfoxaflor from 6 to 24 g a.s./ha, in accordance with the EPPO standard PP 1/225 '*Minimum effective dose'*. 4 trials were set up in the Southern EU regulation 1107/2009 zone taking data from both EPPO climatic zones (Mediterranean and Maritime). One spring and one autumn trials were set up in the Central EU regulation 1107/2009 zone in the Maritime EPPO climatic zone. The Central zone data were used in order to enhance the available database and because winter oilseed rape crops in UK and France are generally planted in similar climatic and agronomic conditions.

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 specific French CEB Guideline M 191 for the autumn French trials (Method for studying in field the efficacy of insecticides against aphids in autumn in oilseed rape). Five out of the six trials had good natural infestation of aphids and one was artificially infested. The application was performed when the aphid infestation reached sufficient level to obtain reliable results. Trials were set up in winter oilseed rape between 2 and 6 leaves stage (BBCH 12-16) in autumn against *Myzus persicae* and in spring at BBCH 51-80 growth stage against *Brevicoryne brassicae*. Treatments were applied in all trials using compressed air backpack sprayers calibrated to apply 200-300 L/ha spray volume.

Sulfoxaflor showed a dose response against both aphid species reaching the plateau at 18-24 g a.s./ha depending on the evaluation time (**Table 6.4-3**, **Table 6.4-4**). Between the rates of 18 and 24 g a.s./ha, there was no significant difference but the consistency of the data was generally greater in the case of 24 g a.s./ha rate giving a more reliable aphid control. There was no significant difference between the sensitivity of the 2 tested species. The preliminary range finding field trial set up in France in 2006 also showed 25 g a.s./ha is the minimum to achieve sufficient control of MYZUPE in oilseed rape. As BRVCBR or rather MYZUPE are very damaging pests and vectors of viruses, we need to control them at the possible highest level. Therefore, 24 g a.s./ha is considered the minimum effective dose as well as the recommended dose rate for sulfoxaflor against aphids (BRVCBR and MYZUPE) in oilseed rape for both autumn and spring applications.

Table 6.4-3 Efficacy of sulfoxaflor against MYZUPE in oilseed rape for determining the minimum effective dose in autumn.

Days after application	Efficacy of sulfoxaflor in % on MYZUPE sprayed in autumn											
	5-6 g a.s. /ha			12 g a.s. /ha			18 g a.s. /ha			24 g a.s. /ha		
	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials
2-4	**65.9**	(14.2-93.7)	2	**83.0**	(60.5-100)	2	**89.5**	(78.5-98.4)	2	**87.4**	(71.4-98.6)	2
6-11	**74.5**	(9.99-100)	3	**86.1**	(33.3-100)	3	**93.7**	(82.7-100)	3	**93.1**	(70-100)	3
13-14	**85.4**	(72.9-98.4)	2	**95.7**	(89.5-100)	2	**95.6**	(91.6-100)	2	**97.8**	(94.9-100)	2
19-21	**69.3**	(39.7-100)	2	**89.5**	(64.3-100)	2	**96.0**	(86.3-100)	2	**92.2**	(75.3-100)	2

Table 6.4-4 Efficacy of sulfoxaflor against BRVCBR in oilseed rape for determining the minimum effective dose in spring.

Days after application	Efficacy of sulfoxaflor in % on BRVCBR sprayed in spring								
	12 g a.s. /ha			18 g a.s. /ha			24 g a.s. /ha		
	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials
2-4	**84.4**	(62.0-96.8)	2	**92.9**	(64.7-99.6)	2	**89.5**	(75.7-100)	2
6-11	**91.3**	(61.8-99.6)	3	**95.3**	(72.3-100)	3	**96.0**	(81.2-100)	3
13-14	**99.6**	(98.2-100)	2	**92.3**	(40.3-100)	2	**97.4**	(82.4-100)	2

ZRMS conclusion: Aphid control in oilseed rape

The results obtained against *Brevicoryne brassicae* (BRVCBR) and *Myzus persicae* (MYZUPE) in oilseed rape (spring and autumn) showed that the claimed dose rate of 24 g sulfoxaflor/ha can be considered as the minimum effective dose for the control of aphids in oilseed rape.

This conclusion is drawn for France, as the unique known cMS.

In case of a future mutual recognition with MS of the southern zone, a summary of efficacy data carried out in the Mediterranean EPPO zone (4 trials in South of France) should be provided. MS may ask for additional efficacy data.

Aphid control in cotton

In 2010 and 2011, 10 trials were conducted in the Southern EU regulation 1107/2009 zone - Spain (6 trials) and Greece (4 trials) - to determine the minimum effective dose rate for sulfoxaflor in cotton for the control of aphids (*Aphis gossypii)*. The tested rates reflected the proposed label rate of 24 g a.s./ha and a lower rate of 12 g a.s./ha, 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 of the 10 trials had sufficient level of natural infestation to obtain reliable results. One single application was carried out at the crop growth stage of BBCH 10-69 in cotton. 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 specific PP 1/149 "Aphis gossypii on cotton"). Treatments were applied to all trials using backpack sprayers, calibrated to apply a spray volume of 300-1,000 L/ha.

Sulfoxaflor showed a dose response against *Aphis gossypii* reaching the plateau at 24 g a.s./ha. The single application of sulfoxaflor at the 12 g a.s./ha proved to be inferior to the rate of 24 g a.s./ha in the "knock down" effect and the long time residual control. In the intermitten time there was no significant difference betwen the rates, both rates provided sufficient efficacy (**Table 6.4-5**). As *Aphis gossypii* is very damaging pests and also virus vector, we need to control them at the possible highest level and ensure a good knock down and long lasting activity too. Therefore, one application of 24 g a.s./ha is considered to be the minimum effective dose rate for sulfoxaflor against aphids (*Aphis gossypii)* in cotton.

Table 6.4-5 Efficacy of sulfoxaflor at the rate of 12 and 24 g a.s./ha against *Aphis gossypii* (APHIGO) in cotton.

Days after appl.		**Efficacy of sulfoxaflor in % and mean comparison**	
		12 g a.s./ha	**24 g a.s./ha**
		1 spray	**1 spray**
1DAAA	**nr of trials**	**4**	**4**
	mean	68.19	82.94
	limits	45.46 – 78.35	65.1 – 93.8
3DAAA	**nr of trials**	**10**	**10**
	mean	95.82	98.79
	limits	87.96 – 99.75	95.95 - 100
7-9DAAA	**nr of trials**	**10**	**10**
	mean	97.99	99.63
	limits	92.49 – 100	98.49 - 100
14-15DAAA	**nr of trials**	**10**	**10**
	mean	93.64	98.3
	limits	76.67 – 100	93.7 – 100
20-23DAAA	**nr of trials**	***4***	***4***
	mean	74.15	85.59
	limits	6.8 - 100	56.04 - 100

DAAA = days after the application

ZRMS conclusion: Aphid control in cotton
The results obtained against *Aphis gossypii* (APHIGO) in cotton showed that the claimed dose rate of 24 g sulfoxaflor/ha can be considered as the minimum effective dose to the control of aphids in cotton, compared to the half dose.

IIIA 6.5 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 the most important aphid 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 6.5-6** shows the distribution of trials used for the efficacy analysis indicating the number of trials by crop, pest, country, EPPO climatic zone and established year.

Table 6.5-6 Distribution of trials included in the efficacy analysis.

Crop	Pests	Country / Eppo zone	Year / Number of trials	Mediterranean zone trials
Cereals	Aphids (MACSAV, RHOPPA, METODI, TOXOGR)	Czech Rep./ Maritime	2010/1,	0
		France/ Mediterranean / Maritime	2008/2, 2010/5, 2012/1	4 Med (+ 4 Mar)
		Germany/ Maritime	2010/1	0
		Hungary/ South-East	2007/1, 2010/2	0
		Italy/ Mediterranean	2012/2	2
		Portugal/ Mediterranean	2010/1	1
		Spain/ Mediterranean	2008/3, 2010/3, 2011/2	8
		United Kingdom/ Maritime	2010/1	0
Total		**25**	**2007/1, 2008/5, 2010/14, 2011/2, 2012/3**	**15**
Oilseed rape	Aphids (MYZUPE, BRVCBR)	France/ Mediterranean/Maritime	2007/1, 2008/3, 2012/5	4 Med (+ 5 Mar)
		Hungary/ South-East	2008/1,	0
		United Kingdom/ Maritime	2008/2,	0
Total		**12**	**2007/1, 2008/6, 2012/5**	**4**
Cotton	Aphids (APHIGO**)**	Spain/ Mediterranean	2010/3, 2011/3	6
		Greece/ Mediterranean	2010/2, 2011/2	4
Total		**10**	**2010/5, 2011/5**	**10**

Aphid control in cereals

A cross-zonal approach, using data from Czech Republic (1 trial), France (8 trials), Germany (1 trial), Hungary (3 trials), Italy (2 trials), Portugal (1 trial), Spain (8 trials) and United Kingdom (1 trial) was used to demonstrate the efficacy of sulfoxaflor in comparison to market standards against *Sitobion avenae (*MACSAV), *Rhopalosiphum padi* (RHOPPA), *Metopolophium dirhodum* (METODR) and *Schizaphis graminum* (TOXOGR), which are the major aphid species in cereals. Between 2007 and 2012, fifteen trials were set up in spring and ten in autumn in various cereal crops (9 trials in winter barley, 14 trials in winter wheat, 2 trials in durum wheat) where sulfoxaflor was applied at 24 g a.s./ha rate and was compared to different commercial standards having various mode of action (lambda-cyhalothrin, deltamethrin, alpha-cypermethrin, flonicamid and and acetamiprid). The application time was BBCH 11-23 in the autumn when at least 10% of plants were infested by aphid colonies (RHOPPA, MACSAV, METODI). The application time was BBCH 53-85 in the case of spring applications when the pest pressure was at least 2 aphids per ear (MACSAV, RHOPPA, TOXOGR). These pest pressure levels were sufficient to obtain reliable results (0.5-50 aphids/plant or ear) representing a wide range of infestation levels. Spray volume ranged between 200-600 L/ha.

In the autumn applications, sulfoxaflor at 24 g a.s./ha provided a knock down effect slightly inferior to the standard products, but the difference was significant only to pyrethroids. Later, the efficacy increased and became similar to flonicamid and superior to acetamiprid. **Table 6.5-7** shows the efficacy of sulfoxaflor sprayed at 24 g a.s./ha against *Rhopalosiphum padi* (RHOPPA) and *Sitobion avenae* (MACSAV) in the autumn applied cereal trials in comparison to the applied reference products.

In the barley trials where the infection of barley yellow dwarf virus was evaluated, sulfoxaflor decreased the virus infection level and paralell increased the yield significantly. On these observations of virus transmission, sulfoxaflor proved to be as good as the best references, acetamiprid and Lambda-cyhalothrin, and was better than flonicamid. This observation that even if the knock down aphid control was slightly weaker to the best references but sulfoxaflor had equal effect on the barley yellow dwarf virus transmission, suggest that sulfoxaflor has an excellent feeding cessation activity proved also by the preliminary laboratory trials.

In the spring applications, sulfoxaflor at 24 g a.s./ha provided sufficient knock down and long lasting efficacy against both MACSAV and RHOPPA being at least as good as the standard pyrethroids. In 6 spring field trials sulfoxaflor proved to be equivalent to flonicamid applied at 70 g a.s./ha and better than acetamiprid at 50 g a.s./ha against MACSAV (

Table 6.5-8).

In addition to the RHOPPA and MACSAV trials there was 1 autumn trial on *Metopolophium dirhodum* and 1 spring trial on *Schizaphis graminum* where sulfoxaflor at 24 g a.s./ha delivered excellent aphid control being equivalent to the reference products.

In summary, presented data clearly demonstrated that sulfoxaflor applied at the proposed rate of 24 g a.s./ha can deliver effective control of a wide range of aphid species infesting cereal crops in the EU regulatory Southern zone and its efficacy is comparable to widely used standard products. These observations are confirmed by the EU regulatory Central zone data as well, where on the basis of 28 trials, 24 g a.s./ha of sulfoxaflor (GF-2372 at 48 g product/ha) was comparable to market standards delivering sufficent control of the major aphid species (MACSAV, RHOPPA, METODR) in cereals applied either in the autumn or spring (Mezei and Harris, 2014).

Table 6.5-7 Efficacy comparison of sulfoxaflor sprayed at 24 g a.s./ha against *Rhopalosiphum padi* (RHOPPA) and *Sitobion avenae* (MACSAV) in autumn applied cereal trials.

Pest/ Days after application	**Efficacy % of sulfoxaflor and reference products in autumn trials**											
	sulfoxaflor, 24 g a.s. /ha			**lambda-cyhalothrin at 7.5 g a.s. /ha**			**flonicamid at 70 g a.s. /ha**			**deltamethrin, 5-7.5 g a.s. /ha for RHOPPA acetamiprid at 25 g a.s. /ha for MACSAV**		
	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials
RHOPPA 2-3 DAA	69.9	(44.4-100)	5	96.8	(92.7-100)	5	-		-	-		-
	72.4	(44.4-100)	4	-	-	-	78.8	(49.3-100)	4	-		-
	73.1	(44.4-100)	4	-	-	-	-		-	94.5	(80.6-100)	4
RHOPPA 6-8 DAA	84.5	(58.2-100)	5	98.4	(97-100)	5	-		-	-		-
	82.6	(58.2-100)	4	-	-	-	84.6	(56.5-100)	4	-		-
	86.5	(58.2-100)	4	-	-	-	-		-	99.5	(98-100)	4
RHOPPA 12-15DAA	84.2	(70.9-90.8)	4	98.0	(92.5-100)	4	-		-	-		-
	81.9	(70.9-93.2)	3	-	-	-	77.9	(57-97.3)	3	-		-
	91.6	(81.8-100)	3	-	-	-	-		-	100.0	(100-100)	3
RHOPPA 20-21DAA	87.2	(74-96.4)	3	100.0	(100-100)	3	-		-	-		-
	82.6	(74-91.2)	2	-	-	-	75.9	(52.9-98.8)	2	-		-
	95.6	(91.2-100)	2	-	-	-	-		-	100.0	(100-100)	2
MACSAV 2-3 DAA	67	(53.9-82.1)	3	-	-	-	74	(57.3-88.2)	3	70	(47.4-98.3)	3
	59	(53.9-64.1)	2	74	(51.8-96.0)	2	-		-	-		-
MACSAV 6-8 DAA	83	(74.5-88.5)	3				83	(64.4-92.2)	3	73	(46.3-96.0)	3
	80	(74.5-86.6)	2	87	(76.1-98.3)	2	-		-	-		-
MACSAV 12-15 DAA	65	(45-84.1)	2	86	(73-98.1)	2	76	(62.7-88.9)	2	58	(33.3-82.1)	2
MACSAV 20-21 DAA	71	(40.2-89.1)	3	-	-	-	79	(65-87.5)	3	73	(45-96.6)	3
	62	(40.2-85)	2	82	(67-97.8)	2	-		-	-	-	-

Table 6.5-8 Efficacy comparison of sulfoxaflor sprayed at 24 g a.s./ha against *Rhopalosiphum padi* (RHOPPA) and *Sitobion avenae* (MACSAV) in spring applied cereal trials.

Days after application	**Efficacy % of sulfoxaflor and reference products in spring trials**											
	sulfoxaflor at 24 g a.s. /ha			**lambda-cyhalothrin at 5 g a.s. /ha for MACSAV or alpha-cypermethrin at 20 g a.s. /ha for RHOPPA**			**flonicamid at 70 g a.s. /ha**			**acetamiprid at 50 g a.s. /ha**		
	means	**limits**	**nb of trials**	**means**	**limits**	**nb of trials**	**means**	**limits**	**nb of trials**	**means**	**limits**	**nb of trials**
RHOPPA 2-3 DAA	80.6	(75.8-96)	6	84.2	(69.9-98.6)	6	-	-	-	-	-	-

RHOPPA 6-8 DAA	86.4	(72.5-100)	6	87.3	(75.4-99.7)	6	-	-	-	-	-	-
RHOPPA 12-14 DAA	92.2	(86.4-100)	5	85.8	(64.6-100)	5	-	-	-	-	-	-
RHOPPA 20-21 DAA	82.9	(81.2-84.6)	2	70.3	(63-77.5)	2	-	-	-	-	-	-
MACSAV 2-3 DAA	76	(61.4-85.3)	4	86	(69.9-93.4)	4	-	-	-	-	-	-
MACSAV 2-3 DAA	80	(61.4-92.2)	6	-	-	-	83	(69.8-97.8)	6	73	(54.8-95.9)	6
MACSAV 6-8 DAA	90	(79.2-95.4)	4	88	(70.3-95.6)	4	-	-	-	-	-	-
MACSAV 6-8 DAA	93	(79.2-100)	6	-	-	-	91	(79.8-100)	6	77	(55.3-95.7)	6
MACSAV 12-14DAA	96	(91.9-98.9)	3	72.4	(40.7-96)	3	-	-	-	-	-	-
MACSAV 12-14 DAA	97	(91.9-100)	5	-	-	-	96	(91-100)	5	79	(64.2-95.1)	5

DAA = days after the application ; na = not available value for this data point.

ZRMS conclusion: Aphids in cereals

25 efficacy trials were realized in Czech Republic (1 trial), France (4 Maritime trials + 4 Mediterranean trials), Germany (1 trial), Hungary (3 trials), Italy (2 trials), Portugal (1 trial), Spain (8 trials) and the United Kingdom (1 trial) between 2007 and 2012. 15 trials were set up in the Mediterranean zone. 15 trials were carried out in spring and 10 in autumn in various cereal crops (9 trials in winter barley, 14 trials in winter wheat and 2 trials in durum wheat).

Sulfoxaflor was applied at 24 g a.s./ha rate and was compared to different commercial standards.

The results obtained against *Sitobion avenae* (MACSAV) and *Rhopalosiphum padi* (RHOPPA), main aphids in cereals, showed that the efficacy of TRANSFORM applied at the claimed dose of 24 g sulfoxaflor/ha was comparable or superior to that of the references based on acetamiprid (50 g/ha), flonicamid (70 g/ha) and lambda-cyhalothrin (5 g/ha) for MACSAV or alpha-cypermethrin (20 g/ha) for RHOPPA.
The efficacy level of TRANSFORM can be considered as satisfactory in cereals to control aphids.
The product TRANSFORM applied at the claimed dose rate of 24 sulfoxaflor/ha is supposed to have similar efficacy against the other aphids *Metopolophium dirhodum* (METODR) and *Schizaphis graminum* (TOXOGR) than against *Sitobion avenae* (MACSAV) and *Rhopalosiphum padi* (RHOPPA) in cereals.
This conclusion is drawn for France and Italy, as known cMS.
In case of a future mutual recognition with other MS of the southern zone, a summary of efficacy data carried out in the Mediterranean EPPO zone (15 trials) should be provided.

Aphid control in oilseed rape

A cross-zonal approach, using data from France (9 trials), Hungary (1 trial) and United Kingdom (2 trials) was used to demonstrate the efficacy of sulfoxaflor in comparison to commercial standards against *Brevicoryne brassicae* (BRVCBR) and *Myzus persicae* (MYZUPE), which are the dominant aphid species in oilseed rape. Between 2007 and 2012 five trials were set up in spring and seven in autumn when sulfoxaflor applied at 24 g a.s./ha was compared to different commercial standards having different mode of action (lambda-cyhalothrin, deltamethrin, pirimicarb, flonicamid, thiamethoxam, imidacloprid, thiacloprid and acetamiprid). 9 trials were set up in the Southern EU regulation 1107/2009 zone taking data from both EPPO climatic zones (Mediterranean and Maritime). Three trials were set up in the Central EU regulation 1107/2009 zone in the Maritime and South-East EPPO climatic zones. The Central zone data were used in order to enhance the available data base and because winter oilseed rape crops are generally grown in similar climatic and agronomic conditions in UK and France while Hungary is closer to the Mediterranean conditions.

The application time was BBCH 11-16 in the autumn when at least 10% of plants were infested by aphids (MYZUPE, BRVCBR) and was BBCH 51-82 in the spring applications set up against established colonies of BRVCBR. Applications were carried out using spray volume of 185-300 L/ha. The level of natural aphid infestation at the time of application was always sufficient to obtain reliable results (1-56 aphids/shoot).

In the autumn applications, sulfoxaflor at 24 g a.s./ha provided excelent knock down and residual efficacy against *Myzus persicae* (MYZUPE), which is the dominant species in the autumn (**Table 6.5-9**). Sulfoxaflor was equal in the knock down to the best standard acetamiprid and became the most effective treatment in the residual activity, which is important against the virus vector MYZUPE. The single autumn trial on BRVCBR showed similar tendency.

Table 6.5-9 Efficacy of sulfoxaflor at 24 g a.s./ha against MYZUPE in autumn in oilseed rape in comparison to reference products.

Days after application	Efficacy of sulfoxaflor and references in % on MYZUPE sprayed in autumn											
	sulfoxaflor, 24 g a.s. /ha			acetamiprid, 75 g a.s. /ha			imidacloprid, 50 g a.s. /ha			pirimicarb, 140-250 g a.s. /ha		
	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials
2-4	94.8	(93.9-95.7)	3	94.3	(90.2-97)	3	-	-	-	-	-	-
2-4	95.3	(94.9-95.7)	2	-	-	-	86.9	(78-95.9)	2			
2-4	94.8	(93.9-95.7)	2	-	-	-	-	-	-	86.4	(76.6-96.3)	2
6-11	92.4	(84.8-98.8)	3	88.3	(78.6-97.5)	3	-	-	-	-	-	-
6-11	89.2	(84.8-93.6)	2	-	-	-	81.3	(68-94.7)	2	-	-	-
6-11	92.2	(89-93.6)	2	-	-	-	-	-	-	84.2	(73.8-94.5)	2
13-15	90.5	(83.7-98.4)	3	81.1	(65.4-94.4)	3	-	-	-	-	-	-
13-15	86.6	(83.7-89.4)	2	-	-	-	69.4	(49-89.8)	2	-	-	-
13-15	91.0	(83.7-98.4)	2	-	-	-	-	-	-	77.7	(62.3-93.2)	2
19-21	84.1	(69.9-98)	3	74.1	(44.3-98.4)	3	-	-	-	-	-	-
19-21	77.2	(69.9-84.5)	2	-	-	-	50.6	(28.2-73)	2	-	-	-
19-21	83.9	(69.9-98)	2	-	-	-	-	-	-	65.9	(39.5-92.2)	2

In spring conditions, sulfoxaflor applied at 24 g a.s./ha provided excellent efficacy on BRVCBR during the whole evaluation period being equivalent to the best reference products (lambda-cyhalothrin + pirimicarb, deltamethrin+thiacloprid, tau-fluvalinate or acetamiprid) delivering 92-97% aphid control versus 75-100% by the standards (**Table 6.5-10** and

Table 6.5-11). In the spring and summer season BRVCBR is the dominant species in oilseed rape.

These trials proved that the proposed label rate of sulfoxaflor - 24 g a.s./ha (GF-2372 at 48 g product/ha) - is efficient and comparable to market standards and delivers sufficient control of all major aphid species (MYZUPE at BRVCBR) in oilseed rape applied either in the autumn or spring.

Table 6.5-10 Efficacy of sulfoxaflor at 24 g a.s./ha against BRVCBR in spring in oilseed rape versus references .

Days after application	Efficacy of sulfoxaflor and references in % on BRVCBR sprayed in spring											
	sulfoxaflor, 24 g a.s. /ha			lambda-cyhalothrin + pirimicarb, 6.25+125 g a.s. /ha			lambda-cyhalothrin, 5-7.5 g a.s. /ha			pirimicarb,140 g a.s. /ha		
	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials
2-4	89.5	(80.9-98.1)	2	99.3	(98.6-100)	2	-	-	-	-	-	-
2-4	84	(72-96)	2	-	-	-	81.4	(74-88.9)	2	-	-	-
2-4	96	-	1	-	-	-	-	-	-	82.3	-	1
6-11	95.2	(90.4-100)	2	100.0	(100-100)	2	-	-	-	-	-	-
6-11	88.2	(78.4-98)	2	-	-	-	81.4	(79.9-83)	2	-	-	-
6-11	98	-	1	-	-	-	-	-	-	97	-	1
13-15	95.6	-	1	99.7	-	1	-	-	-	-	-	-
13-15	99	-	1	-	-	-	94	-	1	97	-	1

Table 6.5-11 Efficacy of sulfoxaflor at 24 g a.s./ha against BRVCBR in spring in oilseed rape versus references .

Days after application	Efficacy of sulfoxaflor and references in % on BRVCBR sprayed in spring											
	sulfoxaflor, 24 g a.s. /ha			deltamethrin + thiacloprid, 6.25+62.5 g a.s. /ha			tau-fluvalinate, 48 g a.s. /ha			acetamiprid, 75 g a.s. /ha		
	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials	means	limits	nb of trials
2-4	89.5	(80.9-98.1)	2	93.6	(93.3-93.8)	2	88.1	(82.9-93.4)	2	-	-	-
2-4	84	(72-96)	2	-	-	-	-	-	-	87.9	(85-90.8)	2
6-11	95.2	(90.4-100)	2	98.0	(97.3-98.8)	2	96.8	(95-98.7)	2	-	-	-
6-11	88.2	(78.4-98)	2	-	-	-	-	-	-	93.4	(91.9-95)	2
13-15	95.6	-	1	98.7	-	1	100	-	1	-	-	-
13-15	99	-	1	-	-	-	-	-	-	97	-	1

ZRMS conclusion: Aphids control in oilseed rape

12 efficacy trials were realized in France (5 Maritime trials + 4 Mediterranean trials), Hungary (1 trial) and United Kingdom (2 trials) between 2007 and 2012. 5 trials were set up in spring and 7 in autumn in oilseed rape.

Sulfoxaflor was applied at 24 g a.s./ha rate and was compared to different commercial standards.

The results obtained against *Brevicoryne brassicae* (BRVCBR) and *Myzus persicae* (MYZUPE) in oilseed rape (spring and autumn) showed that the efficacy of TRANSFORM applied at the claimed dose of 24 g sulfoxaflor/ha was comparable or superior to that of the reference products.
The efficacy level of TRANSFORM can be considered as satisfactory in oilseed rape to control aphids.
This conclusion is drawn for France, as the unique known cMS.
In case of a future mutual recognition with MS of the southern zone, a summary of efficacy data carried out in the Mediterranean EPPO zone (4 trials in South of France) should be provided. MS may ask for additional efficacy data.

Aphid control in cotton

In 2010 and 2011, 10 trials were conducted in Greece (4 trials) and Spain (6 trials) to demonstrate the efficacy of sulfoxaflor against aphids (*Aphis gossypii)* in cotton. 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 specific PP 1/149 “Aphis gossypii on cotton”). Efficacy was tested under a wide range of environmental conditions to fully challenge the product. One application of sulfoxaflor applied at 24 g a.s./ha (GF-2372 at 48 g product/ha) at BBCH 10-69 growth stage of cotton was compared to various reference products (acetamiprid at flonicamid at thiamethoxam at imidacloprid). The natural infestation at the time of application was sufficient (30 – 322 aphids/leaf) to obtain reliable result in all trials. Spray volume ranged between 300-800 L/ha.

The overall efficacy of sulfoxaflor applied at the recommended 24 g a.s./ha rate was comparable to the best standards – acetamiprid and flonicamid and thiamethoxam and was superior to imidacloprid delivering sufficient aphid control during the whole evaluation period (**Table 6.5-12**). These trials proved that the proposed label rate of sulfoxaflor - 24 g a.s./ha (GF-2372 at 48 g product/ha) - is comparable to market standards and can deliver sufficient control of the main aphid species - *Aphis gossypii (*APHIGO*)* - in cotton.

Table 6.5-12 Efficacy of sulfoxaflor at proposed label rate in comparison to reference products against *Aphis gossypii* (APHIGO) in cotton.

Days after appl.		**Efficacy in % and mean comparison**				
		sulfoxaflor	acetamiprid	flonicamid	thiamethoxam	imidacloprid
		24 g a.s./ha	50-75 g a.s./ha	18-140 g a.s./ha	50 g a.s./ha	100 g a.s./ha
1DAAA	**nr of trials**	**2**	**2**	**2**	**-**	**2**
	mean	72.18	78.45	61.78	-	56.39
	limits	65.07-79.3	75.21-81.69	57.65-65.9	-	50.34–62.44
1DAAA	**nr of trials**	**4**	**4**	**4**	**-**	**-**
	mean	82.94	86.94	70.28	-	-
	limits	65.1–93.8	75.2–95.9	57.65–81.2	-	-

3DAAA	**nr of trials**	**2**	**2**	**2**	**-**	**2**
	mean	99.34	99.38	91.52	-	72.4
	limits	99.27-99.4	99.27-99.4	88.5-94.5	-	70.69-74.12
3DAAA	**nr of trials**	**6**	**6**	**6**	**6**	**-**
	mean	98.3	98.2	94.2	91.1	-
	limits	95.9-99.9	94.1-99.8	82.4-99.6	69.8-99.7	-
3DAAA	**nr of trials**	**10**	**10**	**10**	**-**	**-**
	mean	98.79	98.7	94.6	-	-
	limits	*95.95-100*	94.1–99.8	82.38-99.6	-	-
7-9DAAA	**nr of trials**	**2**	**2**	**2**	**-**	**2**
	mean	99.8	99.8	99.1	-	75.6
	limits	99.7-100	99.6-100	99.1-99.1	-	75.4-75.7
7-9DAAA	**nr of trials**	**6**	**6**	**6**	**6**	**-**
	mean	99.7	99.5	98.5	95.8	-
	limits	98.5-100	97-100	92.7-99.8	89.8-99.7	-
7-9DAAA	**nr of trials**	**10**	**10**	**10**	**-**	**-**
	mean	99.63	99.1	98.4	-	-
	limits	*98.49 - 100*	96.9-100	92.7-99.8	-	-
14-15DAAA	**nr of trials**	**2**	**2**	**2**	**-**	**2**
	mean	94.4	95	92.7	-	70.8
	limits	93.7-95.1	94.2-95.8	92.3-93.1	-	69.3-72.3
14-15DAAA	**nr of trials**	**6**	**6**	**6**	**6**	**-**
	mean	99.5	99.8	99.6	98.8	-
	limits	97.8-100	98.8-100	98.8-100	96.7-100	-
14-15DAAA	**nr of trials**	**10**	**10**	**10**	**-**	**-**
	mean	98.3	97.8	96.1	-	-
	limits	93.7 – 100	94.2-100	87.5-100	-	-
20-23DAAA	**nr of trials**	**4**	**4**	**4**	**4**	-

	mean	85.59	90.6	92.5	86.4	-
	limits	56.04 - 100	72.7-100	75-100	73.4-99.8	-

DAA = days after the application ; na = not available value for this evaluation

ZRMS conclusion: Aphids control in cotton

In 2010 and 2011, 10 trials were conducted in Greece (4 trials) and Spain (6 trials) to demonstrate the efficacy of sulfoxaflor against aphids (Aphis gossypii) in cotton.

Sulfoxaflor was applied at 24 g a.s./ha rate and was compared to different commercial standards.

The results obtained against *Aphis gossypii* (APHIGO) in cotton showed that the efficacy of TRANSFORM applied at the claimed dose of 24 g sulfoxaflor/ha was comparable or superior to that of the references based on acetamiprid (50-75 g/ha), flonicamid (18-140 g/ha), thiamethoxam (50 g/ha) and imidacloprid (100 g/ha).
The efficacy level of TRANSFORM can be considered as satisfactory in cotton to control aphids.

IIIA 6.6 EFFECTS ON YIELD AND QUALITY

IIIA 6.7 IMPACT ON THE QUALITY OF PLANTS AND PLANT PRODUCTS

CEREALS

A European (cross-zonal) approach was taken for the demonstration of the possible impact of sulfoxaflor on the quality of plants and plant products. Seven trials were set up in 2010 to determine the possible impact of sulfoxaflor on bread making and brewing processes when applied at 24 and 48 g a.s./ha rate 2-5 weeks before harvest. In the studies the thousand grain weight (TGW) was also measured and a taint test on beer was carried out. All seven trials were set up in France. The trials were carried out on winter wheat (3 trials), on winter barley (2 trials) and on spring barley (2 trials) and deltamethrin was used as comparison active. Crop development stage at application ranged between BBCH 73-87.

Sulfoxaflor had no impact on the thousand grain weight (TGW) of winter wheat, winter barley or spring barley when applied once with a dose rate of up to 48 g a.s./ha 2-5 weeks before harvest (PHI). Sulfoxaflor had no impact on the taste of beer made from spring barley or winter barley when applied once with a dose rate of 24 g a.s./ha with a PHI of 14 days. It can be concluded that GF-2372 when applied at the proposed dose rate of 24 g a.s./ha with a pre-harvest interval (PHI) of 14 days has no impact on the thousand grain weight (TGW) of cereals and the taste of beer. It is concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the plants or plant products.

OILSEED RAPE

One efficacy trial sprayed in autumn 2012 was harvested in France. Crop development stage at application ranged between BBCH 14-18. The oilseed rape was infested by aphids but no virus infestation was observed and the trial was harvested to get data on GF-2372 effect on oilseed rape seed quality. The thousand grain weight and the oil content of the seeds were measured. One autumn application of GF-2372 at 24 g a.s./ha was compared to commercial standards and the untreated. All trials were carried out under GEP. French CEB Guideline M 191 for autumn French trials (Method for studying in field the efficacy of insecticides against aphids in autumn on oilseed rape).

The quality test did not detect significant differences between the untreated and the insecticide treatments regarding the quality of the harvested seeds. The thousand grain weight and oil content of the seeds were the same as in the untreated.One autumn application of sulfoxaflor (GF-2372) at 24 g a.s./ha rate proved to be perfectly safe to oilseed rape having no impact on the thousand grain weight and oil content of the seeds. It is concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the plants or plant products.

COTTON

A total of 2 crop safety studies were established in Greece in cotton in 2009 to confirm that the use of GF-2372 at the proposed rate does not entail any adverse effects on cotton fruits or cotton plants. The cotton field was pest free to evaluate clearly the effect of GF-2372 only on the plant health and colour. 3 applications were done with various dose rates between 25 and 100 g a.s./ha to fully challenge the product. Crop development stage at application ranged between BBCH 51 - 61.

Sulfoxaflor proved to be perfectly safe to cotton even at the 100 g a.s./ha dose rate sprayed 3 times with 10 days interval having no impact on the crop health and colour. 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 effects on qualitative parameters are expected following the application of the product TRANSFORM in treated crops.

IIIA 6.8 EFFECTS ON THE PROCESSING PROCEDURE

CEREALS

A European (cross zonal) approach was taken to evaluate the possible impact of sulfoxaflor on bread making and brewing processes. Seven trials were set up in 2010 to determine the possible impact of sulfoxaflor on bread making and brewing processes. The trials were carried out in spring on winter wheat (3 trials), on winter barley (2 trials) and on spring barley (2 trials). Sulfoxaflor was applied once with a dose rate of 24 g a.s./ha 14 days before harvest. The comparison active deltamethrin was applied once with a dose rate of 6.3 g a.s./ha 30 days before harvest.

Sulfoxaflor had no impact on the the Hagberg falling numbers, the Zeleny tests, the Chopin alvéoGraphic data and the overall panification assessments as well as the malt physical-chemical properties and the fermentation results. It can be concluded that GF-2372 (sulfoxaflor 500 g a.s./kg) when applied at the proposed dose rate of 24 g a.s./ha with a pre-harvest interval (PHI) of 14 days has no impact on the bread making, malting or brewing processes of cereals. It is concluded that commercial use of sulfoxaflor, when applied as recommended, will not have any deleterious effect on the processing procedures.

OILSEED RAPE and COTTON

As there were no phytotoxicity symptoms in the efficacy 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 processing procedures.

ZRMS conclusion about the effects on the processing procedure
No negative effects on the transformation process are expected following the application of the product TRANSFORM in treated crops.

IIIA 6.9 EFFECTS ON THE YIELD OF TREATED PLANTS AND PLANT PRODUCTS

CEREALS

Seven trials were set up in 2010 in France on winter wheat (3 trials), on winter barley (2 trials) and on spring barley (2 trials) to study the impact of sulfoxaflor treatments on bread making and on brewing processes. In these studies the yield and the specific weight were measured. Sulfoxaflor was applied once at 24 and 48 g a.s./ha 14 days or 30 days before harvest.

Sulfoxaflor did not negatively affect the grain moisture and the yield on the three tested crops and the specific weight on wheat. 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.

OILSEED RAPE

One efficacy trial sprayed in autumn 2012 was harvested in France. The oilseed rape was slightly infested by aphids but no virus infestation was observed and the trial was harvested to get data on GF-2372 effect on oilseed rape yield and seed quality. One application of GF-2372 at 24 g a.s./ha was performed in autumn and compared to commercial standards and the untreated.

The harvest did not show significant difference between the untreated and the insecticide treatments regarding the yield and the quality of seeds. One autumn application of sulfoxaflor (GF-2372) at 24 g a.s./ha rate proved to be perfectly safe to oilseed rape having no impact on the yield. 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.

COTTON

A total of 2 crop safety studies were established in Greece in cotton in 2009 to confirm that the use of GF-2372 at the proposed rate does not entail any adverse effects on the yield of cotton plants and for proving this cotton yield was measured and recorded. The cotton field was pest free to evaluate clearly the effect of GF-2372 only on the plant health and yield. 3 applications were done with various dose rates between 25 and 100 g a.s./ha to fully challenge the product.

Sulfoxaflor proved to be perfectly safe to cotton even at the 100 g a.s./ha dose rate sprayed 3 times with 10 days interval having no impact on the crop health and the yield. 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 effects on yield are expected following the application of the product TRANSFORM in treated crops.

IIIA 6.10 ADVERSE EFFECTS

IIIA 6.11 PHYTOTOXICITY TO HOST CROP

CEREALS

Between 2006 and 2012, a cross-zonal approach, using data from Czech Republic, France, Germany, Hungary, Italy, Portugal, Spain and United Kingdom was used to demonstrate the selectivity of sulfoxaflor in cereals. All together, 42 trials set up in spring and 10 in the autumn were used for demonstrating the safety of sulfoxaflor in different ceral crops. The spring trials were established on winter wheat, durum wheat, winter barley, spring barley and common oat at their growth stage of BBCH 12-87. The autumn trials were established on winter wheat and winter barley at their growth stage of BBCH 11-23. .

Table 6.11-13 gives an overview on the crop varieties, their growth stages at application and sulfoxaflor maximum dose rates for which phytotoxicity assessments were recorded in trials carried out in the EU regulatory Southern zone.

Table 6.11-13 Summary table on cereal crops and varieties, their growth stages and the maximum rate of sulfoxaflor in the trials set up in the EU regulatory Southern zone.

Trial number	Crop	Variety	Stage at application	Highest sulfoxaflor rate applied
IT12C1C011ET01C	TRZAW	Zena	53-53	24
ES08C1C006IG01	TRZAW	Craklin	55-61	36
ES08C1C006MT01C	TRZSS	Don sebastian	59-59	36
IT12C1C011ET02C	TRZDU	Iride	69-71	24
PT10C1C015MT01C	HORSS	-	69-71	24
ES10C1C015MT01C	TRZSS	-	-	24
FR10C1C015CR05C	TRZAW	Soisson	71-71	24
ES10C1C015MT02C	TRZSS	Craklin	73-75	24
ES10C1C015MT03C	TRZSS	Craklin	73-75	24
FR10C1C015CR06C	TRZAW	Aubusson	73-75	24
FR10C1C015CR08C	TRZAW	Altigo	73-83	24
FR10C1C021CR02C	HORVW	Arturio	73-85	48
FR10C1C021CR01C	HORVS	Sebastian	75-83	48
ES11C1C010MT02C	TRZAW	Craklin	77-77	24
ES11C1C010MT01C	TRZAW	Charger	77-83	24
FR10C1C020CR01C	TRZAW	Dinosor	77-83	48
FR10C1C021CR03C	HORVS	Sebastian	77-85	48

FR10C1C015CR01	TRZDU	Joyau	83-83	24
ES08C1C006MT02C (181)	TRZAW	Mvemese	83-85	36
FR10C1C020CR02C	TRZAW	Premio	83-85	48
FR10C1C021CR04C	HORVW	Arturio	83-87	48
FR10C1C020CR03C	TRZAW	Nirvana	85-87	48
FR10C1C020CR01C	TRZAW	Dinosor	-	48
FR10C1C045CR03C	HORVW	Gaelic	11-11	24
FR08C1C173CR04C	TRZAW	Premio	12-12	24
FR12C1C063CR02C	HORVW	-	12-12	24
FR10C1C045CR02C	HORVW	Cervoise	12-13	24

No incidents of phytotoxicity were recorded in any of the 52 trials carried out during the sulfoxaflor development program from 2006 to 2012 in Europe. Sulfoxaflor proved to be safe to the tested cereal crops on all tested varieties even when applied at a dose rate of 48 g a.s./ha. It can be concluded that GF-2372 (500 g a.s./kg sulfoxaflor), when applied at the proposed dose rate of 24 g a.s./ha with a maximum of two applications in a year is perfectly safe to cereals such as winter wheat, durum wheat, common oat, winter barley and spring barley. This safety statement can be also interpolated to other cereal crops as there is no significant difference between them in sensitivity to insecticides.

OILSEED RAPE

Between 2007 and 2012, a cross-zonal approach, using data from France, Hungary and United Kingdom was used to demonstrate the selectivity of sulfoxaflor in oilseed rape. Five spring trials were established on winter oilseed rape sprayed at their growth stage of BBCH 79-82 and on spring oilseed rape sprayed at their growth stage of BBCH 51-80 (

Table 6.11-14). Seven autumn trials were established on winter oilseed rape sprayed at their growth stage of BBCH 12-18 (**Table 6.11-15**). Assessments of phytotoxicity were made routinely during the duration of the trials in accordance with the EPPO guidelines PP 1/135 (3) (guidelines for the efficacy evaluation of plant protection products – phytotoxicity assessment).

Sulfoxaflor was perfectly safe in every trial applied even at higher rates (36-50 g a.s./ha) than the recommended dose rate. It can be concluded that GF-2372 (500 g a.s./kg sulfoxaflor) when applied at the proposed dose rate of 24 g a.s./ha with a maximum of two applications in a year is perfectly safe to winter and spring oilseed rape.

Table 6.11-14 Summary table on oilseed rape crops and varieties and their growth stages and the spring applied maximum rate of sulfoxaflor.

Trial	**Crop**	**Varieties**	**Crop stage at application BBCH scale**	**Highest applied rate of sulfoxaflor (g a.s./ha)**
FR12C1C009CR05C	BRSNW	Dk expower	79	24
FR12C1C009CR03C	BRSNW	Aviator	79-80	24
HU08C1C126PH01	BRSNW	Es astrid	80-82	36

GB08C1C081DT01	BRSNS	Heros	51-60	36
FR08C1C066CR03C	BRSNN	Beluga	78-80	36

Table 6.11-15 Summary table on oilseed rape crops and varieties and their growth stages and the autumn applied maximum rate of sulfoxaflor.

Trial	**Crop**	**Varieties**	**Crop stage at application at BBCH scale**	**Highest applied rate of sulfoxaflor at g a.s./ha**
FR12C1C009CR02	BRSNW	Es mercure	12	24
FR12C1C009FT01	BRSNW	Dk expertise	14-16	24
FR12C1C009CR04C	BRSNW	Habile	14-18	24
FR08C1C174CR01C	BRSNW	Exocet	15	24
FR08C1C174CR02C	BRSNW	Cabernet	14	24
GB08C1C081SE01C	BRSNW	Castille	13-15	36
FR07X03016CR01C	BRSNN	Standing	11-13	50

COTTON

Between 2010 and 2012, 13 trials were conducted in Greece and Spain to demonstrate the selectivity of sulfoxaflor in cotton. These trials were established on five different cotton varieties at their growth stage of BBCH 10-74. Assessments of phytotoxicity were made routinely during the duration of the trials in accordance with the EPPO guidelines PP 1/135 (3) (guidelines for the efficacy evaluation of plant protection products – phytotoxicity assessment). In some of those trials sulfoxaflor was applied at very high rates upto 100 g a.s./ha and applied 3 times within a month period.

Sulfoxaflor proved to be selective in all cotton varieties as no phytotoxicity symptoms were observed at any assessment even at the highest rates. It can be concluded that GF-2372 (500 g a.s./kg sulfoxaflor), when applied at the proposed dose rate of 24 g a.s./ha with a maximum of two applications in a year is perfectly safe to cotton.

ZRMS conclusion about the phytotoxicity of the product in treated crops
The phytotoxicity of the product TRANSFORM can be considered as negligible in treated crops.

IIIA 6.12 ADVERSE EFFECTS ON HEALTH OF HOST ANIMALS

This is not an EC data requirement / not required by Council Directive 91/414/EEC or Regulation (EC 1107/2009).

ZRMS conclusion
ZRMS agrees.

IIIA 6.13 ADVERSE EFFECTS ON SITE OF APPLICATION

This is not an EC data requirement / not required by Council Directive 91/414/EEC or Regulation (EC 1107/2009).

ZRMS conclusion
ZRMS agrees.

IIIA 6.14 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.

ZRMS conclusion
ZRMS agrees.

IIIA 6.15 ADVERSE EFFECTS ON PARTS OF PLANT USED FOR PROPAGATING PURPOSES

CEREALS

A European (cross-zonal) approach was taken to evaluate the possible impact of sulfoxaflor on grain germination. 7 trials were set up in 2010 to determine the possible impact of sulfoxaflor on bread making and brewing processes. In these studies the germination of the grain harvested from the treated plots was also measured. The trials were carried out in spring on winter wheat (3 trials), on winter barley (2 trials) and on spring barley (2 trials). Sulfoxaflor was applied once with a dose rate of 24 and 48 g a.s./ha at 14 days before harvest. The comparison partner deltamethrin was applied once with a dose rate of 6.3 and 12.6 g a.s./ha 30 days before harvest.

Table 6.15-16 and **Table 6.15-17** present the percentage of germination (% germination) of the grains collected from the trials. The results clearly show that one application of sulfoxaflor at 24 or 48 g a.s./ha applied at a PHI of 14 days has no negative impact on grain germination.

Table 6.15-16 Percentage of germination of winter wheat.

Products	**Rate in g a.s./ha**	**PHI**	**% germination**		
			FR10C1C020CR01C	FR10C1C020CR02C	FR10C1C020CR03C
GF-2372	24	13-16	95.9	96.1	99.9
GF-2372	48	13-16	96.1	96.5	99.3
deltamethrin	6.3	29-34	96.4	96.0	99.6
deltamethrin	12.6	29-34	97.5	94.4	99.9
UNTREATED			96.5	94.6	99.4
Tukey's HSD (P=.05)			*4.08*	*3.15*	*0.8*
Standard Deviation			*1.81*	*1.4*	*0.35*
CV			*1.88*	*1.46*	*0.35*
P(Bartlett's X2)			*0.183*	*0.167*	*0.313*

Replicate Prob(F)	*0.295*	*0.28*	*0.095*
Treatment Prob(F)	*0.757*	*0.179*	*0.089*

Table 6.15-17 Percentage of germination of spring barley and winter barley.

Products	**Rate in g a.s./ha**	**PHI**	**spring barley**		**winter barley**	
			FR11C1C021	FR11C1C021	FR11C1C021	FR11C1C021
GF-2372	24	14-21	97.8 b	97.5	97.8	97.5
GF-2372	48	14-21	99.3 ab	98.3	98.2	98.7
DECIS	6.3	31-35	99.7 ab	97.7	98.5	97.3
DECIS	12.6	31-35	100.0 a	98.3	97.8	99.2
UNTREATED			99.0 ab	98.3	98.8	97.8
Tukey's HSD (P=.05)			2.04	1.49	1.42	2.28
Standard Deviation			0.72	0.53	0.5	0.78
CV			0.73	0.54	0.51	0.8
P(Bartlett's X2)			0.03	0.37	0.48	0.47
Replicate Prob(F)			0.482	0.492	0.094	0.731
Treatment Prob(F)			0.045	0.213	0.155	0.094

Sulfoxaflor had no negative impact on the grain germination of winter wheat, winter barley or spring barley. It can be concluded that GF-2372 (sulfoxaflor at 500 g a.s./kg), when applied at the proposed dose rate of 24 g a.s./ha with one application and a pre-harvest interval (PHI) of 14 days has no impact on the grain germination. Therefore, 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.

OILSEED RAPE and COTTON

No data was generated but no any impact is expected as phytotoxicity has never been observed by sulfoxaflor on any crops targeted in this submission and extended studies on cereals detected no any detrimental effect on seed quality and emergence. Therefore, 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 the propagating purposes in treated crops is expected following the application of the product TRANSFORM.

IIIA 6.16 IMPACT ON SUCCEEDING CROPS

A glasshouse study was conducted by Dow AgroSciences to generate dose response data for GF-2032 (sulfoxaflor, 240 g a.s./L, SC) when applied preemergence to nine monocotyledon and ten 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-2372 (sulfoxaflor, 500 g a.s./kg, WG) 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*. All eleven species were treated with the test substance on 1st March 2011. GF-2372 was applied at five rates (9.38, 18.75, 37.5, 75 and 150 g a.s./ha) and each of these rates also included the adjuvant Silwet L-77 @ 0.05 % v/v. In addition, all elevenspecies were treated with the adjuvant only (Silwet L-77 @ 0.05 % v/v). The five treatment rates plus the adjuvant only application were compared with an untreated water only control.

None of the eleven species displayed visual injury or fresh weight reduction from ‘pre-emergence’ applications of GF-2372 even at 150 g a.s./ha, which is many times higher than the recommended label rate (24 g a.s./ha) for use in cereals, oilseed rape and cotton. It was concluded that sulfoxaflor, does not pose any risk to succeeding or following crops if applied according to label recommendations.

<u>ZRMS conclusion about the impact of the product on succeeding crops</u>

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

IIIA 6.17 IMPACT ON OTHER PLANTS INCLUDING ADJACENT CROPS

A glasshouse study was conducted by Dow AgroSciences to generate dose response data for GF-2032 (sulfoxaflor, 240 g a.s./L, SC) when applied postemergence 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 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.

In summary, 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 adjecant crops.

Another glasshouse study was conducted by Stockbridge Technology Centre Ltd to generate dose response data for GF-2372 (sulfoxaflor, 500 g a.s.kg, WG) when applied post-emergence to four monocotyledon species and seven dicotyledon species. The methodology for the study was based on the EPA Ecological Effects Test Guidelines, OPPTS 850.4250 and OECD 227. The test species consisted of four monocotyledon species (Oats, Ryegrass, Maize and Onion) and seven dicotyledonous 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 *Cucurbitaceae.* All eleven species were treated with the test substance on 1st March 2011. GF-2372 was applied at five rates (9.38, 18.75, 37.5, 75 and 150 g as/ha) and each of these rates also included the adjuvant Silwet L-77 @ 0.05 % v/v. In addition, all eleven species were treated with the adjuvant only (Silwet L-77 @ 0.05 % v/v). The five treatment rates plus the adjuvant only application were compared with an untreated water only control. Cucumber displayed some visual injury at the two highest treatment rates. The other ten species did not display visual injury. Regression analysis was undertaken and determined EC 25 and EC 50 values of > 150 g a.s./ha (the highest rate tested) for each species for both foliar fresh weight and shoot height, actually no impact was detected for any treatments.

On the basis of these trials it was concluded that sulfoxaflor does not pose any risk to crops including succeeding or following or adjacent crops if applied according to label recommendations.

ZRMS conclusion about the impact of the product on adjacent crops
No negative effect on adjacent crops should be expected following the application of the product TRANSFORM.

IIIA 6.18 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 *Sitobion avenae* and *Rhopalosiphum padi* in cereals and *Myzus persicae* in oilseed rape. A sensitivity baseline and a monitoring are requested for those target pests.
For information, the French recommendations are as follows:
-A monitoring of resistance to sulfoxaflor should be put in place (one monitoring for all products based on sulfoxaflor) on *Sitobion avenae* and/or *Rhopalosiphum padi* in cereals and on *Myzus persicae* in oilseed rape.
It is up to each cMS to judge about the reliability of these recommendations.

IIIA 6.19 ECONOMICS

This is not an EC data requirement / not required by Council Directive 91/414/EEC or Regulation (EC 1107/2009).

IIIA 6.20 BENEFITS

IIIA 6.21 SURVEY OF ALTERNATIVE PEST CONTROL MEASURES

This is not an EC data requirement / not required by Council Directive 91/414/EEC or Regulation (EC 1107/2009).

IIIA 6.22 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.

ZRMS conclusion about the compatibility with current management practices including IPM
Being an insecticide, the product can affect and reduce some of the beneficial populations.

IIIA 6.23 CONTRIBUTION TO RISK REDUCTION

This is not an EC data requirement / not required by Council Directive 91/414/EEC or Regulation (EC 1107/2009).

IIIA 6.24 OTHER/SPECIAL STUDIES

Rainfastness

Two replicated glasshouse study was conducted by Dow AgroSciences, scientists based in the company headquarters in Indianapolis USA, to determine the period after application required for 2 sulfoxaflor formulations, GF-2372 (sulfoxaflor 500 g a.s./Kg) and GF-2626 (sulfoxaflor 120 g a.s./L), to be rainfast. 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 incubated for 3 days in controlled environment before determining aphid control efficacy.

Data from these studies demonstrated 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 6.25 SUMMARY AND ASSESSMENT OF DATA ACCORDING TO POINTS 6.1 TO 6.7

All information included in this dRR (Part B – Section 7) is in the form of summaries of data which are presented and discussed in details in the following report: Biological Assessment Dossier for GF-2372 (sulfoxaflor) field uses in the EU regulatory Southern zone. A summary of data is available in that BAD in IIIA 6.6 section and not repeated here.

The table below shows the uses validated by zRMS.

Country (cMS)	**Crops**	**Pests**	**Pests supported in valid efficacy trials**	**Maximum application rate**	**Maximum number of applications per season**	**zRMS conclusion efficacy section**
Southern zone (EL)	Cotton	Aphids	*Aphis gossypii* (APHIGO)	48 g/ha (24 g sulfoxaflor/ha)	2	Acceptable for cMS
Southern zone (FR)	Oilseed rape	Aphids	*Myzus persicae* (MYZUPE) and *Brevicoryne brassicae* (BRVCBR)	48 g/ha (24 g sulfoxaflor/ha)	2	Acceptable for cMS
Southern zone (FR, IT)	Cereals	Aphids	*Sitobion avenae* (MACSAV) and *Rhopalosiphum padi* (RHOPPA)	48 g/ha (24 g sulfoxaflor/ha)	2	Acceptable for cMS

Considering the data submitted:

- ✓ The efficacy level of TRANSFORM is considered as satisfactory for all the claimed uses.
- ✓ The risk of phytotoxicity of TRANSFORM is considered as negligible for all the claimed uses.
- ✓ The risk of negative impact of TRANSFORM on yield, quality, transformation processes, propagation, succeeding crops and adjacent crops are considered as negligible.
- ✓ There is a risk of resistance development or appearance to sulfoxaflor for *aphids Sitobion avenae* and *Rhopalosiphum padi* in cereals and *Myzus persicae* in oilseed rape requiring a monitoring.

This conclusion is drawn for known cMS. In case of a future mutual recognition with other MS of the southern zone, a summary of efficacy data carried out in the Mediterranean EPPO zone should be provided. MS may ask for further efficacy data in oilseed rape (only 4 Mediterranean trials).

IIIA 6.26 LIST OF TEST FACILITIES INCLUDING THE CORRESPONDING CERTIFICATES

The list of test facilities including the corresponding certificates is located in the following report: IIIA 6.7 Biological Assessment Dossier for GF-2372 (sulfoxaflor) field uses in the EU regulatory Southern zone 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.

IIIA 6.27 APPENDIX 1: LIST OF DATA SUBMITTED IN SUPPORT OF THE EVALUATION

Annex Point	Author	Report Date	Title	Source	Company Report No.	GLP/GEP Y/N	Published Y/N	Data Protection Claimed Y/N	Owner[3]
IIIA 6.1	Oakley, J.N et al.	2005	Responses of summer cereal aphid populations to reduced rate aphicide applications in field plots of winter wheat.	Agricultural and Forest Entomology 7, pp.211–218		N	Y	N	
IIIA 6.1	Poehling, H-M, Frier, B; Kluken, A.M	2007	Grain, in *Aphids as Crop Pests*, ed. by van Emden H and Harrington R.	IPM Case studies:CABI Wallingford UK pp. 597-611		N	Y	N	
IIIA 6.1	HGCA	2012	Controlling aphids and virus diseases in cereals and oilseed rape	HGCA Information Sheet 16/Summer 2012		N	Y	N	
IIIA 6.1	Stevens, M., McGrann, G., Clark, B.	2008	Turnip yellows virus (syn Beet western yellows virus): an emerging threat to European oilseed rape production?	Broom's Barn Research Centre, Higham, Bury St Edmunds ,Suffolk IP28 6NP		N	Y	N	
IIIA 6.1		1997	Methode D' Etude En Plein Champ De L'efficacite De Produits Insecticides Destines A Lutter Contre Les Pucerons A L' Automne En Culture De Colza D' Hiver	Association Française De Protection Des Plantes		N	Y	N	
IIIA 6.1		2013	Ravageurs à l'automne	CETIOM, Guide de culture colza 2013		N	Y	N	
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	
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	

IIIA 6.1 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	
IIIA 6.1 IIIA 6.1.1.2	Abbott, W.S	1925	A method of computing the effectiveness of an insecticide..	J. Econ. Entomol.; 18 : pp.265-267		N	Y	N	
IIIA 6.1.1.1 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
IIIA 6.2.8.4	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	
IIIA 6 IIIA 6.2.8.4	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	
IIIA 6.1.1.1	Davis ,G.E. et al.	2013	Fungicidal Asessement of X11422208 (sulfoxaflor)	Dow AgroSciences		Y	N	Y	Dow AgroSciences
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	
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	
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	

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	N	Dow AgroSciences
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	
IIIA 6.2.8	IRAG	2013	Knock –down resistance (kdr) in Grain Aphids	Insecticide Resistance Action Group ,UK.		N	Y	N	
IIIA 6.2.8 IIIA 6.2.8.9	Foster,S.P et al.	2013	Amutation (L1014F) in the voltage-gated sodium channel of the grain aphid, *Sitobion avenae*, is associated with resistance to pyrethoid insecticides	SCI (wileyonlinelibrary.com) DOI 10.1002/ps.3683		N	Y	N	
IIIA 6.1.2.1 IIIA 6.1.3.1	Blenkinsop, S et al.	2008	Developing climatic scenarios for pesticide fate modelling in Europe.	Environmental Pollution 154., PP : 219-231		N	Y	N	
IIIA 6.2.1.1	Mezei, I., Harris, D.	2014	Biological dossier for GF-2372 registration in EU regulatory Central zone	Dow AgroSciences		N	N	Y	Dow AgroSciences
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		Y	N	Y	Dow AgroSciences
IIIA 6.1.1.1	Geng, C et al.	2011	Speed of action of Sulfoxaflor on aphid feeding: Inhibition of honeydew production.	Dow AgroSciences	2008723	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.1	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	
IIIA 6.1.1.1	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	TBC	Y	N	Y	Dow AgroSciences
IIIA 6.5.3	Kubiszak, M.E., Mezei, I., King, J.E., Gomez, L.E. and Friar,	2014	Residual Activity of Sulfoxaflor in Laboratory Rain Fast Bioassays on the Green Peach Aphid, Myzus persicae	Dow AgroSciences	TBC	Y	N	Y	Dow AgroSciences

	T.A.,								
IIIA 6.1.1.2	Hoffmann,P	2008	XR-208 EFFICACY against aphids in winter barley.	Dow AgroSciences	HU07X03017PH01	Y	N	Y	Dow AgroSciences
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	Y	N	Y	Dow AgroSciences
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	
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	
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	
IIIA 6.1.1.1	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	
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	Insect Biochemistry and Molecular Biology		Y	Y	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	
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	
IIIA 6.1.1.2	Tas,Istvan P	2006	Efficacy of sulfoximine analogs compared to commercial standards on MACSAV in cereals	Dow AgroSciences Hungary Kft.	HU06X03006PT01	Y	N	Y	Dow AgroSciences

IIIA 6.1.1.2	Tas,Istvan P	2006	Efficacy of sulfoximine analogs compared to commercial standards on MACSAV in cereals	Dow AgroSciences Hungary Kft	HU06X03006PT02	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	Gonzalez,Ignacio	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cereal in Spain ?	Agricultura y Ensayo	ES08C1C006IG01	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	Torne ,Maria	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cereal in Spain?	Agricultura y Ensayo	ES08C1C006MT01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	Torne,Maria	2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cereal in Spain?	Agricultura y Ensayo	ES08C1C006MT02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	Torne,Maria	2010	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cereal in Spain?	Agricultura y Ensayo	ES10C1C015MT01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	Torne,Maria	2010	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cereal in Spain?	Agricultura y Ensayo	ES10C1C015MT02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	Torne,Maria	2010	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cereal in Spain?	Agricultura y Ensayo	ES10C1C015MT03C	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	Richard, Christian	2010	Bridging study to compare the efficacy of XDE-208 (GF-2372) to XDE-208 (GF-2032) against summer aphids in cereals	Syntech Research	FR10C1C015CR01	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	Richard, Christian	2010	Bridging study to compare the efficacy of XDE-208 (GF-2372) to XDE-208 (GF-2032) against summer aphids in cereals	Syntech Research	FR10C1C015CR05C	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	Richard, Christian	2010	Bridging study to compare the efficacy of XDE-208 (GF-2372) to XDE-208 (GF-2032) against summer aphids in cereals	Syntech Research	FR10C1C015CR06C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	Richard, Christian	2010	Bridging study to compare the efficacy of XDE-208 (GF-2372) to XDE-208 (GF-2032) against summer aphids in cereals	Syntech Research	FR10C1C015CR08C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	Torne, Maria	2010	What is the efficacy and selectivity of XDE-208 (GF-2626) on aphids in cereal in Spain?	Agricultura y Ensayo	PT10C1C015MT01C	Y	N	Y	Dow AgroSciences

IIIA 6.1.4.1 IIIA 6.1.4.2 IIIA 6.1.4.3 IIIA 6.2.1.1 IIIA 6.2.5	Richard, Christian	2010	Effect of sulfoxaflor on the breadmaking quality of wheat. Europe, Spring 2010	Syntech Research	FR10C1C020CR01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1 IIIA 6.1.4.2 IIIA 6.1.4.3 IIIA 6.2.1.1 IIIA 6.2.5	Richard, Christian	2010	Effect of sulfoxaflor on the breadmaking quality of wheat. Europe, Spring 2010	Syntech Research	FR10C1C020CR02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1 IIIA 6.1.4.2 IIIA 6.1.4.3 IIIA 6.2.1.1 IIIA 6.2.5	Richard, Christian	2010	Effect of sulfoxaflor on the breadmaking quality of wheat. Europe, Spring 2010	Syntech Research	FR10C1C020CR03C	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1 IIIA 6.1.4.2 IIIA 6.1.4.3 IIIA 6.2.1.1	Richard, Christian	2010	Effect of sulfoxaflor on the brewing quality of barley. Europe, Spring 2010	Syntech Research	FR10C1C021CR01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1 IIIA 6.1.4.2 IIIA 6.2.1.1	Richard, Christian	2010	Effect of sulfoxaflor on the brewing quality of barley. Europe, Spring 2010	Syntech Research	FR10C1C021CR02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1 IIIA 6.1.4.2 IIIA 6.2.1.1	Richard, Christian	2010	Effect of sulfoxaflor on the brewing quality of barley. Europe, Spring 2010	Syntech Research	FR10C1C021CR03C	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1 IIIA 6.1.4.2 IIIA 6.2.1.1	Richard, Christian	2010	Effect of sulfoxaflor on the brewing quality of barley. Europe, Spring 2010	Syntech Research	FR10C1C021CR04C	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1	Richard, Christian	2010	Effect of sulfoxaflor (GF-2372) on seed germination when applied 14 days before harvest on barley and wheat. Europe, Spring 2010	Galys SAS	GHE-P 12600 Laboratory data	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1	Richard, Christian	2010	Effect of sulfoxaflor on the breadmaking quality of wheat. Europe, Spring 2010.	Galys SAS	GHE-P 12601 Laboratory data	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1	Richard, Christian	2010	Study of unintentional effects of sulfoxaflor (GF-2372) on beer and malt quality and process	IFBM	GHE-P 12602 Laboratory data	Y	N	Y	Dow AgroSciences

IIIA 6.2.8.6	Zotz, A; Longhurst, C.	2011	2011 Zonal Biological Assessment Dossier GF-2372 Central Zone	Dow AgroSciences		Y	N	Y	Dow AgroSciences
IIIA 6.1.1.1 IIIA 6.2.6 IIIA 6.2.7	Schmitzer, P.R Donley, K	2008	Crop safety of XDE-208	Dow AgroSciences	259318	Y	N	Y	Dow AgroSciences
IIIA 6.2.6 IIIA 6.2.7	Rockcliff, C - a	2011	Effects of GF-2372 (sulfoxaflor, 500 g as/kg, WG)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
IIIA 6.2.7	Rockcliff, C - b	2011	Effects of GF-2372 (sulfoxaflor, 500 g as/kg, WG) 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
IIIA 6.2.8.6	Babcock, J.et al.	2011	Biological characterization of sulfoxaflor, a novel insecticide.	Pest Manag Sci 67: 328–334		N	Y	N	
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	
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	
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
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 AgroSciences
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		N	N	Y	Dow AgroSciences
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	

IIIA 6.2.8.6	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	
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	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.6 IIIA 6.2.8.9	Gorman, K.et al.	2009	Activity of XDE208 against multi-resistant Hemipteran pests.	Rothamsted Research, United Kingdom.	2008458	Y	N	Y	Dow AgroSciences
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	
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	
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	
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	
IIIA 6 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	
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	
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	
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	

IIIA 6.2.8.9		2009	Current status of insecticide resistance in Q biotype Bemisia tabaci populations from Crete.	Pest. Manag. Sci. 2009, 65, 313-322.		N	Y	N	
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	
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	
IIIA 6	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	
IIIA 6.1.1.2 IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	DOW AGROSCIENCES	2007	XR-208 Efficacy against aphids in winter barley.	Dow AgroSciences	HU07X03017PH01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.1 IIIA 6.2.1.1	Dow Agrosciences	8 jan 2009	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cereal in Spain?	Dow AgroSciences	ES08C1C006IG01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.1 IIIA 6.2.1.1	AGRICULTURA Y ENSAYO S.L., SP	24 nov 2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cereal in Spain?	AGRICULTURA Y ENSAYO S.L., SP	ES08C1C006MT01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.1 IIIA 6.2.1.1	AGRICULTURA Y ENSAYO S.L., SP	24 nov 2008	What is the efficacy and selectivity of XDE-208 (GF-2032) on aphids in cereal in Spain?	AGRICULTURA Y ENSAYO S.L., SP	ES08C1C006MT02C (181)	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.1	SOLEVI, FR	1 dec 2009	Efficacy of XDE-208 on aphids in cereal crop when Autumn applied. Europe, 2008.	SOLEVI, FR	FR08C1C173CR04C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	ZKUSEBNI STANICE KLUKY, S.R.O. CZ	15 sep 2011	What is the efficacy of sulfoxaflor against aphid vectors of virus diseases on autumn cereals?	ZKUSEBNI STANICE KLUKY, S.R.O. CZ	CZ10C1C045TN01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.1 IIIA 6.2.1.1	AGRARTEST, DE	12 dec 2011	What is the efficacy of sulfoxaflor against aphid vectors of virus diseases on autumn cereals?	AGRARTEST, DE	DE10C1C045AZ01C	Y	N	Y	Dow AgroSciences

IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	AGRICULTURA Y ENSAYO S.L., SP	28 may 2010	What is the efficacy and selectivity of XDE-208 (GF-2626) on aphids in cereal in Spain?	AGRICULTURA Y ENSAYO S.L., SP	ES10C1C015MT01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	AGRICULTURA Y ENSAYO S.L., SP	16 dec 2010	What is the efficacy and selectivity of XDE-208 (GF-2626) on aphids in cereal in Spain?	AGRICULTURA Y ENSAYO S.L., SP	ES10C1C015MT02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	AGRICULTURA Y ENSAYO S.L., SP	16 dec 2010	What is the efficacy and selectivity of XDE-208 (GF-2626) on aphids in cereal in Spain?	AGRICULTURA Y ENSAYO S.L., SP	ES10C1C015MT03C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	DOW AGROSCIENCES	9 jun 2010	Bridging study to compare the efficacy of xde-208 (gf-2372) to xde-208 (gf-2032) against summer aphids in cereals.	Dow AgroSciences	FR10C1C015CR01	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	SYNTECH RESEARCH	4 jun 2010	Bridging study to compare the efficacy of xde-208 (gf-2372) to xde-208 (gf-2032) against summer aphids in cereals.	SYNTECH RESEARCH	FR10C1C015CR05C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	SYNTECH RESEARCH	30 sep 2010	Bridging study to compare the efficacy of xde-208 (gf-2372) to xde-208 (gf-2032) against summer aphids in cereals.	SYNTECH RESEARCH	FR10C1C015CR06C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	SYNTECH RESEARCH	5 jan 2011	Bridging study to compare the efficacy of xde-208 (gf-2372) to xde-208 (gf-2032) against summer aphids in cereals.	SYNTECH RESEARCH	FR10C1C015CR08C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	SYNTECH RESEARCH	3 nov 2011	What is the efficacy of sulfoxaflor against aphid vectors of virus diseases on autumn cereals?	SYNTECH RESEARCH	FR10C1C045CR02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	PRESTAGRO. FR	10 nov 2011	What is the efficacy of sulfoxaflor against aphid vectors of virus diseases on autumn cereals?	PRESTAGRO. FR	FR10C1C045CR03C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	DEWAR CROP PROTECTION, UK	6 nov 2011	What is the efficacy of sulfoxaflor against aphid vectors of virus diseases on autumn cereals?	DEWAR CROP PROTECTION, UK	GB10C1C045SE01C	Y	N	Y	Dow AgroSciences

IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	DOW AGROSCIENCES	4 nov 2011	What is the efficacy of sulfoxaflor against aphid vectors of virus diseases on autumn cereals?	Dow AgroSciences	HU10C1C045JP02	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	DOW AGROSCIENCES	21 dec 2011	What is the efficacy of sulfoxaflor against aphid vectors of virus diseases on autumn cereals?	Dow AgroSciences	HU10C1C045SS01	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	APAS, PT	13 dec 2010	What is the efficacy and selectivity of XDE-208 (GF-2626) on aphids in cereal in Spain?	APAS, PT	PT10C1C015MT01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	AGRICULTURA Y ENSAYO S.L., SP	3 oct 2011	What is the efficacy and selectivity of XDE-208 (GF-2626) on aphids in cereal in Spain?	AGRICULTURA Y ENSAYO S.L., SP	ES11C1C010MT01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	AGRICULTURA Y ENSAYO S.L., SP	3 oct 2011	What is the efficacy and selectivity of XDE-208 (GF-2626) on aphids in cereal in Spain?	AGRICULTURA Y ENSAYO S.L., SP	ES11C1C010MT02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	STAPHYT	2012	Efficacy of sulfoxaflor (gf-2372) against cereal aphids in autumn. Europe, 2012.	STAPHYT	FR12C1C063CR02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	AGRI 2000, IT	31 aug 2012	What is the efficacy of sulfoxaflor against aphids in cereals?	AGRI 2000, IT	IT12C1C011ET01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.1 IIIA 6.1.3.1 IIIA 6.2.1.1	AGROLAB	19 jan 2013	What is the efficacy of sulfoxaflor against aphids in cereals?	AGROLAB	IT12C1C011ET02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	DOW AGROSCIENCES	15-Nov-2006	X11422208 efficacy against Myzus persicae in winter rape.	Dow AgroSciences	FR06X03025MT01	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	DOW AGROSCIENCES	4-Dec-2006	Efficacy of sulfoximine analogs compared to commercial standards on BRVBR in OSR.	Dow AgroSciences	HU06X03007IM01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.2	SYNTECH RESEARCH FR S.A.S.,	10-Dec-2007	XR-208 Efficacy against Myzus persicae and selectivity in vegetable.	SYNTECH RESEARCH FR S.A.S., FR	FR07X03016CR01C	Y	N	Y	Dow AgroSciences

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IIIA 6.1.3.2 IIIA 6.2.1.2	DOW AGROSCIENCES	21-Aug-2008	Efficacy of xde-208 against aphids in oilseed rape	Dow AgroSciences	HU08C1C126PH01	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	DOW AGROSCIENCES	29-Oct-2008	What is the comparative efficacy of xr-208 when applied for the control of aphids in oilseed rape. Uk 2008.	Dow AgroSciences	GB08C1C081DT01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.2	SYNTECH RESEARCH FR S.A.S., FR	6-Nov-2008	Efficacy of XDE-208 on aphids in oilseed rape crop. Europe, Spring 2008.	SYNTECH RESEARCH FR S.A.S., FR	FR08C1C066CR03C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	DEWAR CROP PROTECTION, UK	10-Nov-2008	What is the comparative efficacy of xr-208 when applied for the control of aphids in oilseed rape. Uk 2008.	DEWAR CROP PROTECTION, UK	GB08C1C081SE01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.2	SOLEVI, FR	1-Dec-2008	Efficacy of XDE-208 on aphids in oilseed rape crop. Europe, Autumn 2008.	SOLEVI, FR	FR08C1C174CR02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.2	SOLEVI, FR	15-Jan-2009	Efficacy of XDE-208 on aphids in oilseed rape crop. Europe, Autumn 2008.	SOLEVI, FR	FR08C1C174CR01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.1	ANADIAG FRANCE	12-Jun-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	ANADIAG FRANCE	FR12C1C009CR05C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	DOW AGROSCIENCES	13-Nov-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	Dow AgroSciences	FR12C1C009CR02	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	SYNTECH RESEARCH FR S.A.S., FR	23-Nov-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	SYNTECH RESEARCH FR S.A.S., FR	FR12C1C009CR03C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	DOW AGROSCIENCES	29-Nov-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	Dow AgroSciences	FR12C1C009FT01	Y	N	Y	Dow AgroSciences

IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.1.4.1 IIIA 6.1.4.3 IIIA 6.2.1.2	CETIOM	29-Nov-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	CETIOM	FR12C1C009CR04C	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	DOW AGROSCIENCES	15-Nov-2006	X11422208 efficacy against Myzus persicae in winter rape.	Dow AgroSciences	FR06X03025MT01	Y	N	Y	Dow AgroSciences
IIIA 6.1.1.2	DOW AGROSCIENCES	4-Dec-2006	Efficacy of sulfoximine analogs compared to commercial standards on BRVBR in OSR.	Dow AgroSciences	HU06X03007IM01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.2	SYNTECH RESEARCH FR S.A.S., FR	10-Dec-2007	XR-208 efficacy against Myzus persicae and selectivity on vegetable.	SYNTECH RESEARCH FR S.A.S., FR	FR07X03016CR01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.2	DOW AGROSCIENCES	21-Aug-2008	Efficacy of xde-208 against aphids in oilseed rape	Dow AgroSciences	HU08C1C126PH01	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	DOW AGROSCIENCES	29-Oct-2008	What is the comparative efficacy of xr-208 when applied for the control of aphids in oilseed rape. Uk 2008.	Dow AgroSciences	GB08C1C081DT01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.2	SYNTECH RESEARCH FR S.A.S., FR	6-Nov-2008	Efficacy of XDE-208 on aphids in oilseed rape crop. Europe, Spring 2008.	SYNTECH RESEARCH FR S.A.S., FR	FR08C1C066CR03C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	DEWAR CROP PROTECTION, UK	10-Nov-2008	What is the comparative efficacy of xr-208 when applied for the control of aphids in oilseed rape. Uk 2008.	DEWAR CROP PROTECTION, UK	GB08C1C081SE01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.2	SOLEVI, FR	1-Dec-2008	Efficacy of XDE-208 on aphids in oilseed rape crop. Europe, Autumn 2008.	SOLEVI, FR	FR08C1C174CR02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.2	SOLEVI, FR	15-Jan-2009	Efficacy of XDE-208 on aphids in oilseed rape crop. Europe, Autumn 2008.	SOLEVI, FR	FR08C1C174CR01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.2 IIIA 6.2.1.1	ANADIAG FRANCE	12-Jun-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	ANADIAG FRANCE	FR12C1C009CR05C	Y	N	Y	Dow AgroSciences

IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	DOW AGROSCIENCES	13-Nov-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	Dow AgroSciences	FR12C1C009CR02	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	SYNTECH RESEARCH FR S.A.S., FR	23-Nov-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	SYNTECH RESEARCH FR S.A.S., FR	FR12C1C009CR03C	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.2.1.2	Dow AgroSciences	29-Nov-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	Dow AgroSciences	FR12C1C009FT01	Y	N	Y	Dow AgroSciences
IIIA 6.1.2.2 IIIA 6.1.3.2 IIIA 6.1.4.1 IIIA 6.1.4.3 IIIA 6.2.1.2	CETIOM	29-Nov-2012	Efficacy of sulfoxaflor (GF-2626) against aphids in oilseed rape. Europe, 2012.	CETIOM	FR12C1C009CR04C	Y	N	Y	Dow AgroSciences
IIA 6.1.1.2	Nick Kavardinas	2006	A comparative efficacy of X11422208 and X11286222 to imidacloprid, thiamethoxam, and acetamiprid against Aphis gossypii in cotton	Dow AgroSciences Export SAS,Greece	GR06X03010NK01	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1	Vasilis Apostolidis	2009	Effect (yield and appearance of two sulfoxaflor formulations GF-2372 and GF-2032) of cotton yield and crop appearance	Dow AgroSciences Export SAS,Greece	GR09C1C019VA01	Y	N	Y	Dow AgroSciences
IIIA 6.1.4.1 IIIA 6.1.4.3	Vasilis Apostolidis	2009	Effect (yield and appearance of two sulfoxaflor formulations GF-2372 and GF-2032) of cotton yield and crop appearance	Dow AgroSciences Export SAS,Greece	GR09C1C019VA02	Y	N	Y	Dow AgroSciences

IIIA 6.1.3.3 IIIA 6.2.1.3	Agrotecnica Del Sur, Spain	2010	What rate of sulfoxaflor is required to control aphids in cotton - 500WG	Agrotecnica Del Sur, Spain	ES10C1C044MT01C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.3 IIIA 6.2.1.3	Agrotecnica Del Sur, Spain	2010	What rate of sulfoxaflor is required to control aphids in cotton - 500WG	Agrotecnica Del Sur, Spain	ES10C1C044MT02C	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.3	Dow AgroSciences Iberica S.A., Spain	2010	What rate of sulfoxaflor is required to control aphids in cotton - 500WG	Dow AgroSciences Iberica S.A., Spain	ES10C1C044SK01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.3 IIIA 6.2.1.3	Dow Agrosciences Export SAS, Greece	2010	Activity of sulfoxaflor applied once against cotton aphids in cotton	Dow Agrosciences Export SAS, Greece	GR10C1C044VA01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.3 IIIA 6.2.1.3	Dow Agrosciences Export SAS, Greece	2010	Activity of sulfoxaflor applied once against cotton aphids in cotton	Dow Agrosciences Export SAS, Greece	GR10C1C044VA02	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.3 IIIA 6.2.1.3	Dow Agrosciences Export SAS, Greece	2011	Activity of sulfoxaflor applied once against cotton aphids in cotton	Dow Agrosciences Export SAS, Greece	GR11C1C034VA01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.3 IIIA 6.2.1.3	Dow Agrosciences Export SAS, Greece	2011	Activity of sulfoxaflor applied once against cotton aphids in cotton	Dow Agrosciences Export SAS, Greece	GR11C1C034VA02	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.3 IIIA 6.2.1.3	Dow Agrosciences Export SAS, Greece	2011	Activity of sulfoxaflor applied once against HELIAR in cotton – Thessaloniki 2011	Dow Agrosciences Export SAS, Greece	GR11C1C062VA01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.3 IIIA 6.2.1.3	Dow AgroSciences Iberica S.A., Spain	2011	What rate of sulfoxaflor is required to control aphids in cotton - 500WG	Dow AgroSciences Iberica S.A., Spain	ES11C1C008SK01	Y	N	Y	Dow AgroSciences
IIIA 6.1.3.3 IIIA 6.2.1.3	Dow AgroSciences Iberica S.A., Spain	2011	What rate of sulfoxaflor is required to control aphids in cotton - 500WG	Dow AgroSciences Iberica S.A., Spain	ES11C1C008SK02	Y	N	Y	Dow AgroSciences

IIIA 6.1.3.3 IIIA 6.2.1.3	Agrotecnica Del Sur, Spain	2011	What rate of sulfoxaflor is required to control aphids in cotton - 500WG	Agrotecnica Del Sur, Spain	ES11C1C008MT01C	Y	N	Y	Dow AgroSciences
IIIA 6.2.1.3	Dow Agrosciences Export SAS, Greece	2012	What is the efficacy of sulfoxaflor against whiteflies in cotton?	Dow Agrosciences Export SAS, Greece	GR12C1C030VA01	Y	N	Y	Dow AgroSciences
IIIA 6.2.1.3	Dow Agrosciences Export SAS, Greece	2012	What is the efficacy of sulfoxaflor against whiteflies in cotton?	Dow Agrosciences Export SAS, Greece	GR12C1C030VA02	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.7	Dow AgroSciences Iberica S.A., Spain	2013	GF-2626 efficacy on neonicotionoid-resistant *Myzus persicae* in stone fruits.Peach.	Dow AgroSciences	ES12C1C003MT01C	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.7	Dow AgroSciences Iberica S.A., Spain	2013	GF-2626 efficacy on neonicotionoid-resistant *Myzus persicae* in stone fruits.Peach.	Dow AgroSciences	ES12C1C003MT02C	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.7	Dow AgroSciences Iberica S.A., Spain	2013	GF-2626 efficacy on neonicotionoid-resistant *Myzus persicae* in stone fruits.Peach.	Dow AgroSciences	ES12C1C003RF01	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.7	Dow AgroSciences Iberica S.A., Spain	2013	GF-2626 efficacy on neonicotionoid-resistant *Myzus persicae* in stone fruits.Peach	Dow AgroSciences	ES13C1C038MT03C	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.7	Dow AgroSciences Iberica S.A., Spain	2013	GF-2626 efficacy on neonicotionoid-resistant *Myzus persicae* in stone fruits.Peach	Dow AgroSciences	ES13C1C038MT04C	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.7	Dow AgroSciences Iberica S.A., Spain	2013	GF-2626 efficacy on neonicotionoid-resistant *Myzus persicae* in stone fruits.Peach	Dow AgroSciences	ES13C1C038MT05C	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.7	Dow AgroSciences Iberica S.A., Spain	2013	GF-2626 efficacy on neonicotionoid-resistant *Myzus persicae* in stone fruits.Peach	Dow AgroSciences	ES13C1C038RF01	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.7	Dow AgroSciences	2013	GF-2626 efficacy on neonicotionoid-resistant *Myzus persicae* in stone fruits.Peach	Dow AgroSciences	FR13C1C038CR01C	Y	N	Y	Dow AgroSciences
IIIA 6.2.8.7	Dow AgroSciences	2013	GF-2626 efficacy on neonicotinoid-resistant *Myzus persicae* in stone fruits.Nectarine	Dow AgroSciences	IT13C1C038ET01C	Y	N	Y	Dow AgroSciences

List of data submitted in support of the evaluation

ZRMS relied on all provided studies.

IIIA 6.28 APPENDIX 2: GAP TABLE(S) CHECKED BY ZRMS

GF-2372 South Zone Field Crops - Summary of EU intended uses

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

PPP (product name/code)	**GF-2372**	**Formulation type:**	**WG**
active substance 1	**sulfoxaflor**	**Conc. of as 1:**	**500 g/kg**
safener **NA**		**Conc. of safener:**	**NA**
synergist **NA**		**Conc. of synergist:**	**NA**
Applicant:	**Dow AgroSciences**	**professional use**	**Y**
Zone(s): Southern		**non professional use**	**N**

Verified by MS: **yes**

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation (crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					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, kg as/ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha min / max		e.g. safener/synergist per ha e.g. recommended or mandatory tank mixtures
1	South (EL)	Cotton	F	Aphids (all stages)	Ground applied foliar spray, broadcast	BBCH 20-87 May-Sep	a)1 b)2 (7 days min. interval between applications)	a) 0.048 b) 0.096	a) 0.024 b) 0.048	300 - 1000	14	Two applications would be minimum 7 days interval.
2	South (FR)	Oilseed Rape	F	Aphids (all stages)	Ground applied foliar spray, broadcast	BBCH 10 - 29 Sep-Dec BBCH 30 – 87 Apr-Jun	a)1 b)2 (21 days min. interval between applications)	a) 0.048 b) 0.096	a) 0.024 b) 0.048	100-300	28	Two applications would be minimum 21 days interval. Only 1 application is allowed in the Sep-Dec interval followed by 1 application in the April-June period. If no autumn application, 2 spring applications are possible.
3	South (FR, IT)	Cereal (Wheat, Barley, Oats,	F	Aphids (all stages):	Ground applied foliar spray,	BBCH 12-29 Sep-Dec	a)1 b)2 (21 days min. interval	a) 0.048 b) 0.096	a) 0.024 b) 0.048	100-600	21	Two applications would be minimum 21 days interval. Only 1 application is allowed in the Sep-Dec interval followed

		Rye, Spelt, Triticale) [W, S]			broadcast	BBCH 30 – 87 Mar-Jul	between applications)					by 1 application in the March-July period. If no autumn application, 2 spring applications are possible.