FINAL REGISTRATION REPORT

Part B

Section 3

Efficacy Data and Information

Concise summary

Product code: SHA 123000 A

Product name: AZA

Chemical active substance:

Azadirachtin, 10 g/L

Central Zone

Zonal Rapporteur Member State: Poland

CORE ASSESSMENT

Applicant: Sharda Cropchem España S.L.

Submission date: October 2020

MS Finalisation date: 21/05/2021

Version history

When	What
May 2021	ZRMs evaluated dRR submitted by Applicant.

Table of Contents

3 Efficacy Data and Information (including Value Data) on the Plant Protection Product (KCP 6)

Transformation of the dRR (applicant version) into the RR (zRMS version)

The process chosen by the zRMS to transform the dRR into a RR should be explained. Options are to rewrite the document (with track change or not) or to use commenting boxes such as the following:

Comments of zRMS:	The commenting boxes are filled-in by the zRMS. They are usually placed at the end of each chapter. Commenting boxes should be understandable alone and refer very precisely to the text commented. The main advantage of their use is to distinguish easily between the applicant and the zRMS text.

3.1 Summary and conclusions of zRMS on Section 3: Efficacy (KCP 6)

Abstract

Comments of zRMS: Overall summaries are not necessary here. It was provided at the end of each chapter of the dRR.

Table 3.1-1: Acceptability of intended uses (and respective fall-back GAPs, if applicable)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Use-No. [e]	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F, Fn, Fpn G, Gn, Gpn or I**	**Pests or Group of pests controlled** (additionally: devel-opmental stages of the pest or pest group)	**Application**				**Application rate**			**PHI** (days)	**Remarks:** e.g. g safener/synergist per ha [f]	**zRMS Conclusion** (efficacy)
					Method / Kind	Timing / Growth stage of crop & season	Max. number a) per use b) per crop/ season	Min. inter-val between applications (days)	kg or L product / ha a) max. rate per appl. b) max. total rate per crop/season	g or kg as/ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha min / max			
Zonal uses (field or outdoor uses, certain types of protected crops)														
1	CEU	**Tomato**	F,	*Aleuroids, Thrips, Aphids*	Foliar Spray	Apply at pest presence BBCH 12-85	a) 2 b) 2	7-10	a) 3.0 b) 6.0	a) 0.03 b) 0.06	750-1000	3	DE: Plant height until 50 cm 2 l/ha in 600 l/ha, from 50 to 125 cm 2.5 l/ha in 800 l/ha, over 125 cm 3 l/ha in 1000 l/ha	To be con-firmed by cMS
2	CEU	**Potato**	F	Collorado beetle *(Leptinotarsa decem-lineata)*	Foliar Spray	Apply at pest presence BBCH 12-91	a) 2 b) 2	7-10	a) 2.5 b) 5.0	a) 0.025 b) 0.05	500-1000	3		To be con-firmed by cMS
3	CEU	**Ornamentals**	F	*Aleuroids, Thrips, Aphids*	Foliar Spray	Apply at pest presence BBCH 12-89	a) 2 b) 2	7-10	a) 3.0 b) 6.0	a) 0.03 b) 0.06	750-1000	3		To be con-firmed by cMS
Interzonal uses (use as seed treatment, in greenhouses (or other closed places of plant production), as post-harvest treatment or for treatment of empty storage rooms)														
4														
5														
Minor uses according to Article 51 (zonal uses)														
6														
7														
Minor uses according to Article 51 (interzonal uses)														
8														
9														

3.2 Efficacy data (KCP 6)

Introduction

This document summarises the information related to the efficacy data of the plant protection product **AZADIRACHTIN 1% EC (AZA; Product code: SHA 123000 A)** containing the active substance azadirachtin. Azadirachtin is authorised in the Commision Regulation (EU) No. 1122/2002 and 2229/2004 after assessment under and inclusion into Annex I of Council Directive 91/414/EEC (2003/5/EC).

The SANCO review report for azadirachtin (4145/2000 (2002)) is considered to provide the relevant review information or a reference to where such information can be found.

Regulation 823/2012 provides specific provisions under Part B which need to be considered by the applicant in the preparation of its submission and by the MS prior to granting an authorisation.

For the implementation of the uniform principles of Annex VI, the conclusions of the review report on azadirachtin, and in particular Appendices I and II thereof, as finalised in the Standing Committee on the Food Chain and Animal Health on 18/10/2002 shall be taken into account. Consideration of active substances for Annex 1 inclusion does not include an evaluation of efficacy. Therefore there are no concerns to address arising from the inclusion directive of azadirachtin relating to efficacy.

These concerns have been addressed within the current submission.

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

The detailed assessment of the individual trial and study data is located in the following report:

Report: KCP 6.0/001 Biological Assessment Dossier AZADIRACHTIN 1%, Central

Description of the plant protection product

AZADIRACHTIN 1% EC is a emulsifiable concentrate (EC) containing 10 g/L azadirachtin for use in tomato, potato and ornamentals.

According to the GAP, the proposed application rate of AZADIRACHTIN 1% EC is 3.0 L per hectare (L/ha), with two applications per season, for the control of aleuroids, thrips and aphids in tomato and ornamentals, and is 2.5 L per hectare (L/ha), with two applications per season, for the control of collorado beetle in potato. This will deliver 50 to 60 g azadirachtin per hectare. In the treated crops, the test product was tested against registered rates of the reference products employed, currently marketed in the countries where the trials were conducted.

The data presented in this dossier fully support the label claim for azadirachtin for the control of Aleuroids, Thrips, Aphids in tomato and ornamentals, and the Collorado beetle (*Leptinotarsa decemlineata*) in potato.

Table 3.2-1: Simplified table of currently registered uses and requested uses for the product code.

Uses		Member State	Requested rate(s)	Comments / Other relevant details on GAPs
Crop(s)	**Target(s)**			
Tomato	Aleuroids, Thrips, Aphids	CEU	2 x 3.0 L/ha	-
Potato	Collorado beetle (Leptinotarsa decemlineata)	CEU	2 x 2.5 L/ha	-
Ornamentals	Aleuroids, Thrips, Aphids	CEU	2 x 3.0 L/ha	-

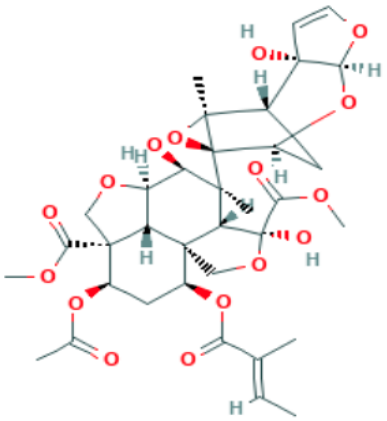
Further details are in the table “All intended uses” in Part B - Section 0.

Description of active substance azadirachtin

Azadirachtin is a limonoid insecticide used in tomato, potato and ornamental for control of Aleuroids, Thrips, Aphids and Collorado beetle (Leptinotarsa decemlineata) across all climatic zones of Europe. Azadirachtin, a chemical compound belonging to the limonoid group, is a secondary metabolite present in neem seeds. It is a highly oxidized tetranortriterpenoid which boasts a plethora of oxygen-bearing functional groups, including an enol ether, acetal, hemiacetal, tetra-substituted epoxide and a variety of carboxylic esters.

Azadirachtin was first developed over 20 years after the compound's discovery, Initially found to be active as a feeding inhibitor towards the desert locust (Schistocerca gregaria), it is now known to affect over 200 species of insects, by acting mainly as an antifeedant and growth disruptor. This compound is found in the seeds (0.2 to 0.8 percent by weight) of the neem tree.

Table 3.2-2: Identity of azadirachtin

Common name	Azadirachtin
IUPAC name	dimethyl (1S,4S,5R,6S,7S,8R,11S,12R,14S,15R)-12-acetyloxy-4,7-dihydroxy-6-[(1S,2S,6S,8S,9R,11S)-2-hydroxy-11-methyl-5,7,10-trioxatetracyclo[6.3.1.02,6.09,11]dodec-3-en-9-yl]-6-methyl-14-[(E)-2-methylbut-2-enoyl]oxy-3,9-dioxatetracyclo[6.6.1.01,5.011,15]pentadecane-4,11-dicarboxylate
CA name	dimethyl (2aR,3S,4S,4aR,5S,7aS,8S,10R,10aS,10bR)-10-(acetyloxy)octahydro-3,5-dihydroxy-4-methyl- 8-[[(2E)-2-methyl-1-oxo-2-butenyl]oxy]-4- [(1aR,2S,3aS,6aS,7S,7aS)-3a,6a,7,7a- tetrahydro-6a-hydroxy-7a-methyl-2,7- methanofuro[2,3-b]oxireno[e]oxepin-1a(2H)- yl]-1H,7H-naphtho[1,8-bc:4,4a-c′]difuran- 5,10a(8H)-dicarboxylate
CIPAC No	627
CAS Registry No.	11141-17-6
EEC No	91/414
Minimum purity	980 g/kg
Structural formula[1]	
Empirical formula	$C_{35}H_{44}O_{16}$
Molecular mass	720.7 g/mol

Mode of action

According to the insecticide resistance action committee (IRAC), azadirachtin has compounds of unknown or uncertain MoA.

[1] Source: Royal Society of Chemistry (RSC). Internet, Tuesday August 22th, 2019. URL: http://www.chemspider.com/Chemical-Structure.55867.html

Information on similar formulations and current approvals

Data presented in this dossier is generated using this formulation in comparison with reference products containing azadirachtin. Azadirachtin is currently registered under a variety of trade names and formulations throughout Europe and a selection of these are described in table below.

Table 3.2-3: Current approvals of azadirachtin products used as reference products in Europe as well as examples of azadirachtin approvals in the in the EU

Country	Product	Active ingredient	Approval number
Austria	Azatin EC	Azadirachtin 26 g/L EC	3994-0
	Neemazal	Azadirachtin 10 g/L EC	2699-0
Czech Republic	Neemazal	Azadirachtin 10 g/L EC	5450-0
France	Azatin EC	Azadirachtin 26 g/L EC	2171331
	Neemazal	Azadirachtin 10 g/L EC	2140090
Germany	Neemazal	Azadirachtin 10 g/L EC	024436-00
	Azatin EC	Azadirachtin 26 g/L EC	024436-63
Greece	Azatin EC	Azadirachtin 26 g/L EC	14617
	OIkos	Azadirachtin 26 g/L EC	14671
	Decis Protech	Deltamethrin 15 g/L EC	14346
Italy	Neemazal	Azadirachtin 10 g/L EC	011561
	Azatin EC	Azadirachtin 26 g/L EC	016634
Spain	Adina	Azadirachtin 10 g/L EC	22166
	Neemazal	Azadirachtin 10 g/L EC	24200

For further physico-chemical properties, please refer to Registration Report Part B Section 1: Identity, physical and chemical properties, other information.

Description of the target pests

Key targets for this product are thrips, aphids and aleuroids in tomto and ornamental and collorado beetle in potato.

The key targets for this product are described below:

Table 3.2-4: Glossary of pests mentioned in the dossier.

EPPO code	Scientific name	Common name
Aphids		
APHIFO	*Aphis forbesi*	Strawberry aphid
APHIFG	*Aphis frangulae*	Strawberry aphid
APHIGO	*Aphis gossypii*	Melon aphid
MYZUPE	*Myzus persicae*	Green aphid
MACSRO	*Macrosiphum rosae*	Green rose aphid
APHISP	*Aphis sp.*	-
Aleuroids		
DIALCI	*Dialeurodes citri*	Citrus whitefly
BEMITA	*Bemisia tabaci*	Silver-leaf whitefly
TRIAVA	*Trialeurodes vaporariorum*	Glasshouse whitefly
Thrips		
THRISP	*Thrips sp.*	-
THRITB	*Thrips tabaci*	Common cotton thrips
Collorado beetle		
LPTNDE	*Leptinotarsa decemlineata*	Ten-lined potato beetle

Table 3.2-5: Major / minor status of intended uses (for all cMS and zRMS).

Crop and/or situation	Crop status		Pests or group of pests controlled	Pest status	
	Major	**Minor**		**Major**	**Minor**
Tomato	CEU	CEU	Aleuroids	CEU	-
Tomato	CEU	CEU	Aphids	CEU	-
Tomato	CEU	CEU	Thrips	CEU	-
Potato	CEU	-	Collorado beetle (Leptinotarsa decemlineata)	CEU	-
Ornamental	-	CEU	Aleuroids	CEU	-
Ornamental	-	CEU	Aphids	CEU	-
Ornamental	-	CEU	Thrips	CEU	-

Aphids sp.

Aphids are small sap-sucking insects and members of the superfamily Aphidoidea. Common names include greenfly and blackfly, although individuals within a species can vary widely in colour. The group includes the fluffy white woolly aphids. A typical life cycle involves flightless females giving living birth to female nymphs without the involvement of males. Maturing rapidly, females breed profusely so that the number of these insects multiplies quickly. Winged females may develop later in the season, allowing the insects to colonise new plants. In temperate regions, a phase of sexual reproduction occurs in the autumn, with the insects often overwintering as eggs.

Aphids are among the most destructive insect pests on cultivated plants in temperate regions. In addition to weakening the plant by sucking sap, they act as vectors for plant viruses and disfigure ornamental plants with deposits of honeydew and the subsequent growth of sooty moulds. Because of their ability to rapidly increase in numbers by asexual reproduction, they are a highly successful group of organisms from an ecological standpoint.

Bemisia tabaci

The silverleaf whitefly (*Bemisia tabaci*, also informally referred to as the sweet potato whitefly) is one of several species of whitefly that are currently important agricultural pests. A review in 2011 concluded that the silverleaf whitefly is actually a species complex containing at least 24 morphologically indistinguishable species

The silverleaf whitefly thrives worldwide in tropical, subtropical, and less predominately in temperate habitats. Cold temperatures kill both the adults and the nymphs of the species. The silverleaf whitefly can be confused with other insects such as the common fruitfly, but with close inspection, the whitefly is slightly smaller and has a distinct wing color that helps to differentiate it from other insects.

While the silverleaf whitefly had been known in the United States since 1896, in the mid-1980s a virulent strain appeared in poinsettia crops in Florida. For convenience that strain was referred to as strain B (biotype B), to distinguish it from the milder infestation of the earlier known strain A. Less than a year after its identification, strain B was found to have moved to tomatoes, and other fruit and vegetable crops. Within five years, the silverleaf whitefly had caused over $100 million in damage to Texas and California agriculture industries.

Leptinotarsa decemlineata

The Colorado potato beetle (Leptinotarsa decemlineata), also known as the Colorado beetle, the ten-striped spearman, the ten-lined potato beetle or the potato bug, is a major pest of potato crops. It is approximately 10 millimetres (0.39 in) long, with a bright yellow/orange body and five bold brown stripes

along the length of each of its elytra. Native to America, it spread rapidly in potato crops across America and then Europe from 1859 onwards.

Colorado potato beetle females are very prolific and are capable of laying over 500 eggs in a 4- to 5-week period.The eggs are yellow to orange, and are about 1 mm (0.039 in) long. They are usually deposited in batches of about 30 on the underside of host leaves. Development of all life stages depends on temperature. After 4–15 days, the eggs hatch into reddish-brown larvae with humped backs and two rows of dark brown spots on either side. They feed on the leaves of their host plant. Larvae progress through four distinct growth stages (instars). First instars measure approximately 1.50 mm (0.059 in) long, and the last (fourth) instars measure 8 mm (0.31 in) in length. The first through third instars each last about 2–3 days duration; the fourth lasts 4–7 days. Upon reaching full size, each fourth instar spends several days as a nonfeeding prepupa, which can be recognized by its inactivity and lighter coloration. The prepupae drop to the soil and burrow to a depth of several inches, then pupate.In 5 to 10 days, the adult beetle emerges to feed and mate. This beetle can thus go from egg to adult in as little as 21 days.Depending on temperature, light conditions, and host quality, the adults may enter diapause and delay emergence until spring. They then return to their host plants to mate and feed; overwintering adults may begin mating within 24 hours of spring emergence.In some locations, three or more generations may occur each growing season.

Compliance with the Uniform Principles

Comprehensive field trials were conducted in Poland, Lithuania, Greece, Czech Republic, France, Italy and Germany in 2016 and 2017. The trials followed the corresponding EPPO guidelines. The GEP-requirement and the Uniform Principles are taken care of.

Information on trials submitted (3.1 Efficacy data)

Trials in this dossier were carried out by contractor companies and Official Research institutes, all of which follow the EPPO guidelines and are officially recognized by the competent authorities to carry out field registration trials in accordance with the principles of Good Experimental Practice (GEP).

On the basis of the EPPO guideline 1/241(1) "Guidance on comparable climates", the trials included in this dossier have been grouped and summarized by EPPO zone. EPPO zone have been defined by taking into account differences between the agro-climatic sub-areas of the EPPO region.

In general the trials were conducted according to the respective EPPO guidelines.

In support of the current application for registration of Azadirachtin 1% EC, twenty-eight efficacy trials were conducted in the Maritime, the North-east, the South-east and the Mediterranean EPPO zones and greenhouse.

Table 3.2-6: Presentation of efficacy trials (efficacy trials, preliminary trials...)

Use(s) *	Target(s)*	Country	Years	Type of trial**	Number of trials (number of valid trials)					GEP, non-GEP, official***	Comments (any other relevant information)
					EPPO zone				Gr.		
					MAR	MED	S-E	N-E			
Tomato	Aphids	Greece	2016	MED + E	-	2 (2)	-	-	-	GEP	
		Poland	2017	MED + E	-	-	-	1 (1)	1 (1)	GEP	
					-	2 (2)	-	1 (1)	1 (1)		
	Thrips	Italy	2016	MED + E	-	1 (1)	-	-	-	GEP	
					-	1 (1)	-	-	-		
	Aleuroids	France	2016	MED + E	-	-	-	-	1 (1)	GEP	
		Italy	2016	MED + E	-	-	-	-	2 (2)	GEP	
		Poland	2017	MED + E	-	-	-	-	1 (1)	GEP	

Use(s) *	Target(s)*	Country	Years	Type of trial**	Number of trials (number of valid trials)					GEP, non-GEP, official***	Comments (any other relevant information)
					EPPO zone				Gr.		
					MAR	MED	S-E	N-E			
					-	-	-	-	4 (4)		
Potato	Collorado beetle	Greece	2016	MED + E	-	1 (1)	-	-	-	GEP	
		Italy	2016	MED + E	-	2 (2)	-	-	-	GEP	
		Czech Rep.	2016	MED + E	2 (2)	-	-	-	-	GEP	
		Germany	2017	MED + E	1 (1)	-	-	-	-	GEP	
		Hungary	2016	MED + E	-	-	2 (2)	-	-	GEP	
		Poland	2016	MED + E	-	-	-	2 (2)	-	GEP	
			2017	MED + E	-	-	-	4 (4)	-	GEP	
		Lithuania	2016	MED + E	-	-	-	1 (1)	-	GEP	
					3 (3)	3 (3)	2 (2)	7 (7)	-		
Ornamentals	Aphids	Germany	2017	MED + E	1 (1)	-	-	-	-	GEP	
		Czech Rep.	2016	MED + E	1 (1)	-	-	-	-	GEP	
		Poland	2016	MED + E	-	-	-	-	1 (1)	GEP	
			2017	MED + E	-	-	-	-	1 (1)	GEP	
					2 (2)	-	-		2 (2)		
		Total, all crops			**5 (5)**	**6 (6)**	**2 (2)**	**8 (8)**	**7 (7)**		

* According to the GAP table. Timing of the application(s) can be added if relevant (e.g. Pre-mergence vs post-emergence, spring vs autumn).
** P = preliminary trial, MED = minimum effective dose, E = efficacy trial.
*** GEP: Good Experimental Practices. Official: carried out by a national official organisation.

Climatic zones

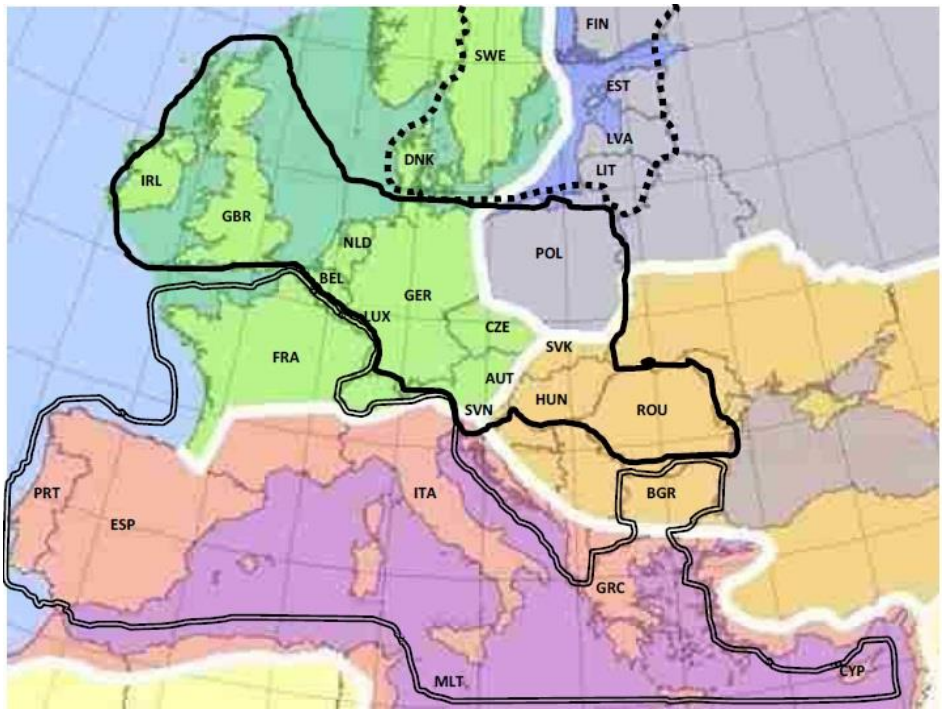
In the current document, data from 28 trials conducted in the Maritime (Germany and Czech Republic), the North-east (Poland and Lithuania), the South-east (Hungary) and the Mediterranean (S-France, Greece and Italy) EPPO zones have been included to support the registration of Azadirachtin 1% EC in the EU Central zone. However, the data from each climatic zone is summarised separately.

Europe is divided into four climatic zones, according to EPPO standard PP 1/241 (1) (Figure 3.2-1). Besides providing guidance in determining comparability of climatic conditions between geographical areas where efficacy evaluation trials are performed, the standard also supports the use of data generated in one country to support registration in another country[2].

Germany and Czech Republic are located in the Maritime EPPO zone; Poland and Lithuania are located in the North-east EPPO zone; Hungary are located in the South-east EPPO zone and S-France, Greece and Italy are located in the Mediterranean EPPO zone are included.

[2] Development of Comparable Agro-Climatic Zones for the International Exchange of Data on the Efficacy and Crop Safety of Plant Protection Products, E. Bouma, 2005 OEPP/EPPO, Bulletin OEPP/EPPO Bulletin 35, 233-238.

Figure 3.2-1: Representation of EPPO climatic zones (in colour: EPPO Standard PP1/241, Guidance on comparable climates) superimposed with the 3 European zones (EC Regulation 1107/2009) (Source: EPPO)



Agronomic conditions

Cultural conditions of the different crops and agronomy (e.g. cultivations used, application methods, cultivars, fertilizer regime, relative times of planting and harvest) do not differ significantly between Poland, Lithuania, Germany, Czech Republic, Hungary, Greece, France and Italy. In tomato, potato and ornamental, the same azadirachtin containing insecticides are already registered and used in the countries where tested for the same uses, i.e. to control aleuroids, thrips, aphids and collorado beetle with two applications.

(i) *Pest physiology*

The physiology of individual pests presented is common throughout Europe. Although trials were performed in different countries and EPPO zones, sites were selected to exert maximum control pressure and to exacerbate treatment differences. No difference in the level of control was apparent between the different countries or regions in which the trials were conducted. The level of control achieved from AZADIRACHTIN 1% EC in the different countries was equivalent throughout the EU.

(ii) *Site selection*

Although trials were performed throughout the EU, in each country the sites were carefully selected to ensure that for each pest species the level of control was assessed on a range of populations and application timings. To exert maximum control pressure and to exacerbate treatment differences in each country this included some trials which contained high pests densities. No differences in the level of control were apparent between the different countries or regions in which the trials were conducted. For each pest species equivalent levels of control were recorded in the countries where present in trials.

(iii) *Agronomic practices*

Agronomic practices in tomato, potato and ornamental crops are similar throughout the South zone as well as in the countries in the connected EPPO zones where trials were conducted. The levels of inorganic fertilizers and other crop inputs are similar between the countries.

(iv) *Varieties*

Although crop varieties tend to differ between countries, the crop safety of AZADIRACHTIN 1% EC has been tested on a wide range of varieties in efficacy trials. The results from these trials show that there are no particularly sensitive varieties. Crop tolerance data generated in one country is therefore relevant in another Member state.

(v) *Trial methodology*

Similar trial methodology was used in all countries. All trials were conducted to GEP by officially recognised testing organisations and in accordance with relevant EPPO standards.

(vi) *Locations*

Trials were performed in the major crop growing areas in each respective country. These areas have been found to be particularly suitable for crops production due to their innate similarity in terms of soil type and climate.

(vii) *Soil*

The active ingredient of AZADIRACHTIN 1% EC – azadirachtin – has both soil and foliar activity. Therefore, in each country, trials have been conducted on a range of soil types with no difference seen in the level of control.

In all efficacy trials conducted in tomato, potato and ornamental in Poland, Lithuania, Greece, France, Italy, Czech Republic and Hungary, the performance of Azadirachtin 1% EC was compared against a commercial standard formulation of azadirachtin currently on the market in Central and Southern Europe (Azatin and Neemazal). In Poland and Hungary, Mospilan 20SG (Acetamiprid) was used as reference product in various efficacy trials. In Greece, Karate zeon (Lambda cyhalothrin 10 g/L CS) was used as reference product in one efficacy trial carried out in potatoes. The trials were carried out on tomato, potato and ornamental.

Table 3.2-7: Presentation of reference standards used in trials (efficacy trials, preliminary trials...)

Trade name	Formulation	Active Ingredient	AI content	Use rates	Countries where used and targets
Azadirachtin reference product					
AZATIN	EC	Azadirachtin	320 g/l	2.0 l/ha 3.0 l/ha	Greece
NEEMAZAL	EC	Azadirachtin	10 g/l	2.0 l/ha 3.0 l/ha	Greece, France, Italy, Lithuania, Czech Republic and Hungary
National reference product					
KARATE ZEON	CS	Lambda cyhalothrin	10 g/l	2.5 l/ha 3.0 l/ha	Greece
DECIS PROTECH	EW	Deltamethrin	15 g/l	3.0 l/ha 6.0 l/ha	France
MOSPILAN	SG	Acetamiprid	200 g/l	0.1 kg/ha 0.2 kg/ha	Poland, Hungary

Comments of zRMS:	This document summarises the information related to the efficacy of the plant protection product – AZA (product code: SHA 123000 A). The formulation of this product is an emulsifiable concentrate (EC) and it containing active substances: azadirachtin (10 g/l). For now azadirachtin is on the list of approved active sub-

	stances. Azadirachtin is a limonoid insecticide used in tomato, potato and ornamental for control of Aleuroids, Thrips, Aphids and Collorado beetle (*Leptinotarsa decemlineata*) across all climatic zones of Europe. Azadirachtin, a chemical compound belonging to the limonoid group, is a secondary metabolite present in neem seeds. It is a highly oxidized tetranortriterpenoid which boasts a plethora of oxygen-bearing functional groups, including an enol ether, acetal, hemiacetal, tetra-substituted epoxide and a variety of carboxylic esters. Azadirachtin was first developed over 20 years after the compound's discovery, Initially found to be active as a feeding inhibitor towards the desert locust (*Schistocerca gregaria*), it is now known to affect over 200 species of insects, by acting mainly as an antifeedant and growth disruptor. In Poland 2 insecticides (Azatin EC, NeemAzal T/S) with the same active compound – azadirachtin are registered and commonly used for protection crops against pests. The product – AZA (product code: SHA 103000A) by Sharda Cropchem España has not been previously evaluated in any country according to Uniform Principles. Poland is a ZRMs. All necessary information's are presented above by Applicant.

3.2.1 Preliminary tests (KCP 6.1)

The activity of azadirachtin is well known, as it has been marketed since 1980's to control a wide range of pests including aphids, thrips, aleuroids and Leptinotarsa decemlineata in many crops as well as in other pest control. Based on the knowledge about the active substance and the experiences with azadirachtin in the GAP claimed uses, the necessary application rates to obtain sufficient control of the pest organism are already known. Therefore, preliminary tests in glasshouses and field trials to assess the biological activity of the active substance or dose range for the plant protection product were not deemed necessary.

Comments of zRMS:	The active substance AZA (product code: SHA 103000 A) – azadirachtin (10 g/l) is registered and has been commonly used in crop protection in EU Countries for many years (since 1980s). So, a large scale efficacy trials are available to evaluate the effectiveness of products containing azadirachtin as active compound. Therefore, there was no need for preliminary range-finding tests in the opinion of Evaluator for AZA.

3.2.2 Minimum effective dose tests (KCP 6.2)

To determine the minimum effective dose rate, data from 9 trials conducted in tomato, 15 trials conducted in potato and 4 trials conducted in ornamentals are included in this section. In the twenty-eight trials, Azadirachtin 1% EC was applied at 2.0, 2.5 and 3.0 L/ha for the control of aleuroids, thrips, aphids and at 1.75, 2.0 and 2.5 L/ha for the control of collorado beetle. The dose rates tested reflects 70%, 80% and 100% of the recommended rate of Azadirachtin 1% EC, in accordance with the EPPO guideline PP 1/225(2) "Minimum effective dose". The dose is selected on the basis of its efficacy performance, product safety parameters and environmental limitations. Efficacy is tested under a range of environmental conditions to fully challenge the product. Data is presented from trials conducted in the Maritime EPPO zone (5; i.e. Czech Republic (3) and Germany (2)), the North-east EPPO zone (8, i.e. Poland (7) and Lithuania (1)), the South-east EPPO zone (2; i.e. Hungary), the Mediterranean EPPO zone (6, i.e. Greece (3) and Italy (3)) and greenhouse (7). Data from each zone has been summarized separately.

Control of aleuroids in tomato

In order to prove and to support the requested dose rate of 3.0 L/ha Azadirachtin 1% EC [30 g azadirachtin per hectare] applied for the control of aleuroids in tomatoes, the assessment results of four efficacy trials performed in the greenhouse in 2016 and 2017 season, are reported. Azadirachtin 1% EC was included in these trials at 3.0 L/ha to demonstrate the recommended dose rate as well as at two lower than recommended dose rates (2.0 L/ha [20 g azadirachtin per hectare] and 2.5 L/ha [25 g azadirachtin/ha]). The rates reflect the proposed label rate as well as 66 and 83% of the full recommended rate of Azadirachtin 1% EC, in accordance with the EPPO standard PP 1/225(2) '*Minimum effective dose'* and the Central zone efficacy requirements.

A summary of the dose response results obtained in the greenhouse efficacy trials is provided in Table 3.2-12.

Table 3.2-8: Minimum effective dose – Efficacy of Azadirachtin 1% EC at proposed label rate and at 66% and 83% dose rates on aleuroids in tomato.

				Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC					
Target: *Aleuroids*	**No. of trials**	**Untreated PESINC**		**2.0 l/ha = 20 g ai/ha**		**2.5 l/ha = 25 g ai/ha**		**3.0 l/ha = 30 g ai/ha**	
		Mean	**Range**	**Mean**	**Range**	**Mean**	**Range**	**Mean**	**Range**
Greenhouse									
2-3 days after treatments	4	44.5	22.5-62.5	58.3	47.9-68.5	68.8	69.8-75.4	71.8	69.2-73.9
7 days after treatments	4	65.7	42.8-75.0	52.4	13.2-67.4	56.3	15.3-73.3	59.3	18.1-78.6
10-14 days after treatmen.	3	83.7	80.2-86.0	53.8	32.4-64.9	49.5	16.2-66.5	52.1	20.6-68.3
Target: *Aleuroids*	**No. of trials**	**Untreated PESSEV**		**2.0 l/ha = 20 g ai/ha**		**2.5 l/ha = 25 g ai/ha**		**3.0 l/ha = 30 g ai/ha**	
		Mean	**Range**	**Mean**	**Range**	**Mean**	**Range**	**Mean**	**Range**
Greenhouse									
2 days after treatments	2	2.7	2.4-2.9	67.5	66.7-68.3	69.3	68.5-70.0	71.1	70.3-71.9
7 days after treatments	2	3.5	2.9-4.1	66.5	65.7-67.3	68.3	67.6-69.0	70.2	69.3-71.1
14 days after treatments	2	4.1	3.3-4.8	63.9	63.1-64.7	65.8	64.9-66.6	67.3	66.5-68.0

The data from the two trials proves the minimum effective dose rate of Azadirachtin 1% EC to control *aleuroids* in tomatoes is 3.0 l/ha (30g ai/ha). Furthermore, the data demonstrated that if the application rate is reduced below this, a clear decrease in control as well as in persistence is observed.

Trials conducted under glasshouse represent a more challenging situation to control these insects since the controlled conditions inside glasshouses have better humidity and temperature for the development of insects. Thus, it is considered that glasshouse trials are valid to demonstrate efficacy in the field.

Based on results achieved on aleuroids in 4 tomatoes trials treated with two applications, it can be concluded that to consistently control frequently occurring aleuroids in tomatoes crops, Azadirachtin 1% EC should be applied two times at 3.0 L/ha.

Control of aphids in tomato

In order to prove and to support the requested dose rate of 3.0 L/ha Azadirachtin 1% EC [30 g azadirachtin per hectare] applied for the control of aphids in tomatoes, the assessment results of four efficacy trials performed in the North-east, the Mediterranean EPPO zones and in greenhouse in 2016 and 2017 season, are reported. Azadirachtin 1% EC was included in these trials at 3.0 L/ha to demonstrate the recommended dose rate as well as at two lower than recommended dose rates (2.0 L/ha [20 g azadirachtin per hectare] and 2.5 L/ha [25 g azadirachtin/ha]). The rates reflect the proposed label rate as well as 66 and 83% of the full recommended rate of Azadirachtin 1% EC, in accordance with the EPPO standard PP 1/225(2) '*Minimum effective dose'* and the Central zone efficacy requirements.

A summary of the dose response results obtained in the North-east zone, the Mediterranean zone and

greenhouse efficacy trials is provided in Table 3.2-13.

Table 3.2-9: Minimum effective dose – Efficacy of Azadirachtin 1% EC at proposed label rate and at 66% and 83% dose rates on aphids in tomato.

Target: *Aphids*	No. of trials	Untreated COUNT Mean	Untreated COUNT Range	Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC 2.0 l/ha = 20 g ai/ha Mean	2.0 l/ha = 20 g ai/ha Range	2.5 l/ha = 25 g ai/ha Mean	2.5 l/ha = 25 g ai/ha Range	3.0 l/ha = 30 g ai/ha Mean	3.0 l/ha = 30 g ai/ha Range
North-east EPPO zone									
3 days after treatments	1	29.0	-	58.7	-	73.0	-	75.8	-
9 days after treatments	1	31.5	-	58.4	-	72.3	-	81.7	-
14 days after treatments	1	36.0	-	55.3	-	62.3	-	77.2	-
Mediterranean EPPO zone									
2 days after treatments	2	49.9	36.5-63.3	38.5	23.7-53.3	74.4	73.4-74.4	93.0	91.0-94.9
7 days after treatments	2	37.5	24.4-50.5	34.3	16.8-51.7	80.0	76.0-84.0	96.1	94.2-98.0
21 days after treatments	2	19.8	16.0-23.5	82.1	64.1-100	96.1	92.1-100	100	100-100
Greenhouse									
6 days after treatments	1	12.5	-	100	-	100	-	100	-
13 days after treatments	1	9.7	-	100	-	100	-	100	-
20 days after treatments	1	5.9	-	100	-	100	-	100	-

The data from the four trials proves the minimum effective dose rate of Azadirachtin 1% EC to control *aphids* in tomatoes is 3.0 l/ha (30g ai/ha). Furthermore, the data demonstrated that if the application rate is reduced below this, a clear decrease in control as well as in persistence is observed.

Trials conducted under glasshouse represent a more challenging situation to control these insects since the controlled conditions inside glasshouses have better humidity and temperature for the development of insects. Thus, it is considered that glasshouse trials are valid to demonstrate efficacy in the field.

Based on results achieved on aphids in 4 tomatoes trials treated with two applications, it can be concluded that to consistently control frequently occurring aphids in tomatoes crops, Azadirachtin 1% EC should be applied two times at 3.0 L/ha.

Control of thrips in tomato

In order to prove and to support the requested dose rate of 3.0 L/ha Azadirachtin 1% EC [30 g azadirachtin per hectare] applied for the control of thrips in tomatoes, the assessment results of one efficacy trial performed in the Mediterranean EPPO zone in 2016 season, are reported. Azadirachtin 1% EC was included in these trials at 3.0 L/ha to demonstrate the recommended dose rate as well as at two lower than recommended dose rates (2.0 L/ha [20 g azadirachtin per hectare] and 2.5 L/ha [25 g azadirachtin/ha]). The rates reflect the proposed label rate as well as 66 and 83% of the full recommended rate of Azadirachtin 1% EC, in accordance with the EPPO standard PP 1/225(2) '*Minimum effective dose'* and the Central zone efficacy requirements.

A summary of the dose response results obtained in the Greenhouse efficacy trials is provided in Table 3.2-14.

Table 3.2-10: Minimum effective dose – Efficacy of Azadirachtin 1% EC at proposed label rate and at 66% and 83% dose rates on thrips in tomato.

Target: *Thrips*	No. of trials	Untreated PESINC Mean	Untreated PESINC Range	Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC 2.0 l/ha = 20 g ai/ha Mean	2.0 l/ha = 20 g ai/ha Range	2.5 l/ha = 25 g ai/ha Mean	2.5 l/ha = 25 g ai/ha Range	3.0 l/ha = 30 g ai/ha Mean	3.0 l/ha = 30 g ai/ha Range

Target: *Thrips*	No. of trials	Untreated PESINC Mean	Untreated PESINC Range	Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC 2.0 l/ha = 20 g ai/ha Mean	2.0 l/ha = 20 g ai/ha Range	2.5 l/ha = 25 g ai/ha Mean	2.5 l/ha = 25 g ai/ha Range	3.0 l/ha = 30 g ai/ha Mean	3.0 l/ha = 30 g ai/ha Range
Mediterranean EPPO zone									
2 days after treatments	1	67.0	-	68.1	-	69.8	-	71.6	-
4 days after treatments	1	74.3	-	69.3	-	71.0	-	73.0	-
8 days after treatments	1	81.0	-	65.7	-	67.5	-	69.5	-
Target: *Thrips*	**No. of trials**	**Untreated PESSEV Mean**	**Untreated PESSEV Range**	**2.0 l/ha = 20 g ai/ha Mean**	**2.0 l/ha = 20 g ai/ha Range**	**2.5 l/ha = 25 g ai/ha Mean**	**2.5 l/ha = 25 g ai/ha Range**	**3.0 l/ha = 30 g ai/ha Mean**	**3.0 l/ha = 30 g ai/ha Range**
Mediterranean EPPO zone									
2 days after treatments	1	44.8	-	65.9	-	67.8	-	70.1	-
4 days after treatments	1	83.8	-	68.1	-	69.9	-	71.9	-
8 days after treatments	1	156.3	-	66.2	-	67.8	-	69.4	-

The data from the trial proves the minimum effective dose rate of Azadirachtin 1% EC to control *thrips* in tomatoes is 3.0 l/ha (30g ai/ha). Furthermore, the data demonstrated that if the application rate is reduced below this, a clear decrease in control as well as in persistence is observed.

Based on results achieved on thrips in one tomato trial treated with two applications, it can be concluded that to consistently control frequently occurring thrips in tomatoes crops, Azadirachtin 1% EC should be applied two times at 3.0 L/ha.

Control of collorado beetle in potato

In order to prove and to support the requested dose rate of 2.5 L/ha Azadirachtin 1% EC [25 g azadirachtin per hectare] applied for the control of Collorado beetle (*Leptinotarsa decemlineata*) in potatoes, the assessment results of fifteen efficacy trials performed in the Maritime, the North-east, the South-east and the Mediterranean EPPO zones in 2016 and 2017 season, are reported. Azadirachtin 1% EC was included in these trials at 2.5 L/ha to demonstrate the recommended dose rate as well as at two lower than recommended dose rates (1.75 L/ha [17.5 g azadirachtin per hectare] and 2.0 L/ha [20 g azadirachtin/ha]). The rates reflect the proposed label rate as well as 70% and 80% of the full recommended rate of Azadirachtin 1% EC, in accordance with the EPPO standard PP 1/225(2) '*Minimum effective dose'* and the Central zone efficacy requirements.

A summary of the dose response results obtained in the Maritime, the North-east, the South-east and the Mediterranean efficacy trials is provided in Table 3.2-11, Table 3.2-12, Table 3.2-13 and Table 3.2-14, respectively.

Table 3.2-11: Minimum effective dose, Maritime zone – Efficacy of Azadirachtin 1% EC at proposed label rate and at 70% and 80% dose rates on collorado beetle in potato.

Target: *Collorado beetle*	No. of trials	Untreated COUINS Mean	Untreated COUINS Range	Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC 1.75 l/ha = 17.5 g ai/ha Mean	1.75 l/ha = 17.5 g ai/ha Range	2.0 l/ha = 20 g ai/ha Mean	2.0 l/ha = 20 g ai/ha Range	2.5 l/ha = 25 g ai/ha Mean	2.5 l/ha = 25 g ai/ha Range
Maritime EPPO zone									
2-3 days after treatments	3	59.7	2.05-162	66.8	-	49.2	34.2-67.1	71.7	55.2-90.5
9-10 days after treatments	3	15.2	0.48-34.0	37.5	.	27.8	16.1-36.0	62.2	38.3-75.3

Table 3.2-12: Minimum effective dose, North-east zone – Efficacy of Azadirachtin 1% EC at proposed label rate and at 70% and 80% dose rates on collorado beetle in potato.

	Mean % Control at a range of doses of azadirachtin

Target: *Collorado beetle*	No. of trials	Untreated COUNT		Azadirachtin 1% EC 2.0 l/ha = 20 g ai/ha		Azadirachtin 1% EC 2.5 l/ha = 25 g ai/ha	
		Mean	Range	Mean	Range	Mean	Range
North-east EPPO zone							
3 days after treatments	6	7.83	2.6-11.78	61.2	5.0-79.6	78.2	40.0-91.9
7-9 days after treatments	6	8.21	1.6-13.43	67.3	2.5-100	74.5	23.8-100
10-15 days after treatments	2	2.3	1.1-3.5	48.5	8.3-88.7	61.7	31.0-92.4
Target: *Collorado beetle*	**No. of trials**	**Untreated PESINC**		**2.0 l/ha = 20 g ai/ha**		**2.5 l/ha = 25 g ai/ha**	
		Mean	**Range**	**Mean**	**Range**	**Mean**	**Range**
North-east EPPO zone							
3 days after treatments	3	44.9	-	98.6	-	98.6	-
8 days after treatments	3	44.9	-	100	-	100	-

Table 3.2-13: Minimum effective dose, South-east zone – Efficacy of Azadirachtin 1% EC at proposed label rate and at 70% and 80% dose rates on collorado beetle in potato.

Target: *Collorado beetle*	No. of trials	Untreated COUINS		Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC 2.0 l/ha = 20 g ai/ha		Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC 2.5 l/ha = 25 g ai/ha	
		Mean	Range	Mean	Range	Mean	Range
South-east EPPO zone							
3 days after treatments	2	29.0	21.3-36.7	44.2	41.4-46.9	55.9	50.7-61.0
7 days after treatments	2	26.5	18.1-34.8	63.0	62.4-63.5	77.1	71.3-2.8
12 days after treatments	2	18.2	7.4-29.0	64.5	63.5-65.5	86.2	84.5-87.8

Table 3.2-14: Minimum effective dose, Mediterranean zone – Efficacy of Azadirachtin 1% EC at proposed label rate and at 70% and 80% dose rates on collorado beetle in potato.

Target: *Collorado beetle*	No. of trials	Untreated PESSEV		Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC 2.0 l/ha = 20 g ai/ha		Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC 2.5 l/ha = 25 g ai/ha	
		Mean	Range	Mean	Range	Mean	Range
Mediterranean EPPO zone							
3 days after treatments	3	33.0	25.2-44.0	63.4	51.6-69.4	66.0	55.2-71.4
9 days after treatments	3	29.6	13.0-38.1	53.7	27.1-67.1	56.3	31.3-69.0
Target: *Collorado beetle*	**No. of trials**	**Untreated PESINC**		**2.0 l/ha = 20 g ai/ha**		**2.5 l/ha = 25 g ai/ha**	
		Mean	**Range**	**Mean**	**Range**	**Mean**	**Range**
Mediterranean EPPO zone							
3 days after treatments	2	71.9	67.8-76.0	68.1	67.8-68.4	70.1	69.8-70.3
9 days after treatments	2	88.8	87.3-90.3	66.2	65.7-66.6	67.8	67.4-68.2

The data from the fifteen trials proves the minimum effective dose rate of Azadirachtin 1% EC to control *collorado beetle* in potatoes is 2.5 l/ha (25g ai/ha). Furthermore, the data demonstrated that if the application rate is reduced below this, a clear decrease in control as well as in persistence is observed.

Based on results achieved on collorado beetle in fifteen potato trial treated with two applications, it can be concluded that to consistently control frequently occurring collorado beetle in potato crops, Azadirachtin 1% EC should be applied two times at 2.5 L/ha.

Control of aphids in ornamentals

In order to prove and to support the requested dose rate of 3.0 L/ha Azadirachtin 1% EC [30 g azadirachtin per hectare] applied for the control of aphids in ornamentals, the assessment results of four efficacy trials performed in the Maritime EPPO zone and greenhouse in 2016 and 2017 season, are reported. Azadirachtin 1% EC was included in these trials at 3.0 L/ha to demonstrate the recommended dose rate as well as at two lower than recommended dose rates (2.0 L/ha [20 g azadirachtin per hectare] and 2.5 L/ha [25 g azadirachtin/ha]). The rates reflect the proposed label rate as well as 66 and 83% of the full recommended rate of Azadirachtin 1% EC, in accordance with the EPPO standard PP 1/225(2) '*Minimum effective dose'* and the Central zone efficacy requirements.

A summary of the dose response results obtained in the Maritime and greenhouse efficacy trials is provided in Table 3.2-15 and Table 3.2-16.

Table 3.2-15: Minimum effective dose, Maritime zone – Efficacy of Azadirachtin 1% EC at proposed label rate and at 66% and 83% dose rates on aphids in ornamentals.

Target: *Aphids*	No. of trials	Untreated COUINS		Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC					
				2.0 l/ha = 20 g ai/ha		2.5 l/ha = 25 g ai/ha		3.0 l/ha = 30 g ai/ha	
		Mean	Range	Mean	Range	Mean	Range	Mean	Range
Maritime EPPO zone									
2-3 days after treatments	2	21.3	9.2-33.3	35.3	30.2-40.3	47.1	11.1-83.2	60.0	32.8-87.2
10 days after treatments	1	44.5	-	40.3	-	83.2	-	87.2	-

Table 3.2-16: Minimum effective dose, greenhouse– Efficacy of Azadirachtin 1% EC at proposed label rate and at 66% and 83% dose rates on aphids in ornamentals.

Target: *Aphids*	No. of trials	Untreated COUINS		Mean % Control at a range of doses of azadirachtin Azadirachtin 1% EC					
				2.0 l/ha = 20 g ai/ha		2.5 l/ha = 25 g ai/ha		3.0 l/ha = 30 g ai/ha	
		Mean	Range	Mean	Range	Mean	Range	Mean	Range
Greenhouse									
4-7 days after treatments	2	22.5	1.7-43.3	87.8	78.3-97.4	93.6	88.5-98.4	93.9	89.3-98.5

The data from the trials proves the minimum effective dose rate of Azadirachtin 1% EC to control *Aphids* in ornamentals is 3.0 l/ha (30g ai/ha). Furthermore, the data demonstrated that if the application rate is reduced below this, a clear decrease in control as well as in persistence is observed.

Trials conducted under glasshouse represent a more challenging situation to control these insects since the controlled conditions inside glasshouses have better humidity and temperature for the development of insects. Thus, it is considered that glasshouse trials are valid to demonstrate efficacy in the field.

Based on results achieved on aphids in four ornamentals trials treated with two applications, it can be concluded that to consistently control frequently occurring aphids in ornamentals crops, Azadirachtin 1% EC should be applied two times at 3.0 L/ha.

Summary and conclusions on the minimum effective dose

Azadirachtin 1% EC applied at 3.0 L/ha to control aphids, thrips and aleuroids in tomato and ornamentals and azadirachtin 1% EC applied at 2.5 L/ha to control collorado beetle in potato achieved moderate to excellent control of all target pests. Reducing the application rate of Azadirachtin 1% EC from the proposed dose rate to 60% to 80% of that rate, resulted in lower levels of efficacy. To ensure that a satisfactory level of control is achieved with the proposed dose rates of 2.5 L/ha and 3.0 L/ha, it is recommended

that Azadirachtin 1% EC is applied under optimal conditions, i.e. early growth stage of the pests and optimal weather conditions.

The same pests are controlled by azadirachtin in the different crops. Therefore, for any label claims not adequately supported for one crop type, Sharda Cropchem España requests that the Zonal Evaluators reads across to the data on the other crop types and application timings.

As will be demonstrated in the following section, this document clearly demonstrates that the efficacy and crop safety of Azadirachtin 1% EC is equivalent to that of the standard azadirachtin reference products (i.e. Azatin, Neemazal) to which it was compared. The applicant therefore wishes to cite the original registrant's data on azadirachtin now out of protection in support of those recommendations on the draft label that are not adequately supported by the applicant's data and requests that the Zonal Evaluator extrapolate from those data.

Comments of zRMS:	In order to provide information to establish the minimum effective dose, some of the trials conducted to demonstrate efficacy should include at least one lower dose(s) (for example 60–80% of the recommended dose) to that which would be recommended. It is utilized to achieve the desired effect. During field tests Applicant used different doses of insecticide – AZA (product code: SHA 103000 A). So, in the appropriate researches of efficacy were tested differ doses and to register was chosen the lowest effective, which is in accordance to EPPO 1/225 (2). What is more, insecticides containing active ingredients – azadirachtin have been allowed to use for many years (since 1980s). To determine the minimum effective dose rate, data from 9 trials conducted in tomato, 15 trials conducted in potato and 4 trials conducted in ornamentals are included in this section. In twenty-eight trials, AZA was applied at 1,75 l/ha to 3,0 L/ha for the control of studied pests (ex. aphids, Colorado beetle, thrips, aleurioides). In tomato and ornamental trials, Applicant studied three different doses: 2,0 l/ha (0,67N), 2,5 l/ha (0,83N) and 3,0 l/ha (N). In N-E, S-E and MED two different doses were studied against potato beetle on potato (2,0 l/ha – 0,8N and 2,5 l/ha – N) and in MAR EPPO zone – three different doses: 1,75 l/ha (0,7N), 2,0 l/ha (0,8N) and 2,5 l/ha (N). Azadirachtin 1% EC applied at 3.0 L/ha to control aphids, thrips and aleuroids in tomato and ornmentals and Azadirachtin 1% EC applied at 2.5 L/ha to control collorado beetle in potato achieved moderate to excellent control of all target pests. Reducing the application rate of Azadirachtin 1% EC from the proposed dose rate to 60% to 80% of that rate, resulted in lower levels of efficacy. To ensure that a satisfactory level of control is achieved with the proposed dose rates of 2.5 L/ha and 3.0 L/ha, it is recommended that Azadirachtin 1% EC is applied under optimal conditions, i.e. early growth stage of the pests and optimal weather conditions.

3.2.3 Efficacy tests (KCP 6.2)

Data from 28 efficacy trials conducted in the Maritime EPPO zone (5; i.e. Czech Republic (3) and Germany (2)), the North-east EPPO zone (8, i.e. Poland (7) and Lithuania (1)), the South-east EPPO zone (2; i.e. Hungary), the Mediterranean EPPO zone (6, i.e. Greece (3) and Italy (3)) and greenhouse (7) have been included in this biological assessment dossier to support the label claims and recommendations on efficacy and selectivity in the EU Central Registration zone.

The 28 efficacy trials were conducted in tomato (9), potato (15) and ornamentals (4).

Efficacy evaluation was based on count of insects caused by the insects on the crop. In the field trials, the number of insects was assessed by counting the number of insects on a sample of a defined number of plants per plot. In the trials used to assess the efficacy of Azadirachtin 1% EC, up to four or more assessments were conducted, starting at the date of application. The summary tables in the following sub sections contain the data from the assessment conducted at three or four different timings after application.

Table 3.2-17: Details on trial methodology

Guidelines	General guidelines	EPPO PP 1/152 (4), PP 1/181 (4), PP 1/135(4)
	Specific guidelines	Tomato: EPPO PP 1/230(1), PP 1/36(3), Potato: EPPO PP 1/12(4) Ornamentals: EPPO PP 1/23(2)
Experimental design	Plot design	RCBD (28)
	Plot size	0.4-240 m²
	Number of replications	4 (28)
Crop	Trials per crop	Tomato (9): LYPES Potato (15): SOLTU Ornamental (4): TOPMA, DAHHY, ROSSS, CENIM
	Varieties per crop	Tomato: Heinz 3402, Vulcan, Gaheris, Genius, Pixel, Galilea, Zuzanna, Denar, Vineta, Krakus, Mercedes Potato: Agria, Liseta, Agata, Adela, Bintje, Innovato, Lujzana Ornamental: Marlena, Ladybird, Dwarf
	Sowing period	Tomato: April 15th to July 8th Potato: January 1st to April 21st Ornamental: April 3th to June 30th
Application	Crop stage (BBCH)* at application	Tomato: BBCH 15-51 Potato: BBCH 33-62 Ornamental: BBCH 61-67
	Timing Pest stage at appl. (1)	Tomato: June 16th to May 23rd Potato: April 4th to July 27th Ornamental: May 31st to July 23rd BBCH 15-67 – for details on the growth stage of the specific pests at application, please refer to summary tables in Appendix 5
	Number of appl. Intervals between appl.	1(6), 2 (22) 7 – 25 days
	Spray volumes	200-1000 L/ha
Assessment	Assessment types	- Visual estimation of biomass reduction per plot compared to 'untreated' ('untreated' = 0 % control); total control = 100 % control) or calculated, based on pests counts (COUNT) in a defined area, as compared to the untreated check.
	Assessment dates	Efficacy: 2 to 21 DAT
Other relevant information	Soil type	Light to heavy soils
	Natural / artificial innoculation…	Natural
	Field / Greenhouse...	Field (21) and Greenhouse (7)

Control of alueroids in tomato crops

Greenhouse

When applied at 3.0 L/ha in the greenhouse, Azadirachtin 1% EC achieved good to excellent control of aleuroids commonly found in tomato. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 15 assessments carried out, where statistical evaluation of the assessment was reported. Trials conducted under glasshouse represent a more challenging situation to control these insects since the controlled conditions inside glasshouses have better humidity and temperature for the development of insects. Thus, it is considered that glasshouse trials are valid to demonstrate efficacy in the field.

Table 3.2-18: Greenhouse: Control obtained with 3.0 L/ha Azadirachtin 1% EC against aleuroids in tomato crops (2-14 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with: Azadirachtin 1% EC at: Mean (min-max) 3.0 L/ha [30 g ai/ha]	Efficacy obtained with: Azadirachtin ref. prod. at Mean (min-max) 1 N [30 g ai/ha]	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control >	=	<	Overall
PESINC								
2-3 days after treatments	3	45.2 (22.5-62.5)	71.1 (69.2-72.2)	67.7 (58.6-72.4)	1	2		=
7 days after treatments	3	73.3 (70.3-75.0)	52.9 (18.1-70.8)	52.7 (17.4-70.9)		3		=
10-14 days after treatments	3	83.7 (80.2-86.0)	52.1 (20.6-68.3)	54.0 (25.0-68.8)		2	1	=
PESSEV								
2 days after treatments	2	2.7 (2.4-2.9)	71.1 (70.3-71.9)	71.5 (70.6-72.3)		2		=
7 days after treatments	2	3.5 (2.9-4.1)	70.2 (69.3-71.1)	70.4 (69.4-71.4)		2		=
14 days after treatments	2	4.1 (3.3-4.8)	67.3 (66.5-68.0)	67.6 (67.0-68.2)		2		=

Conclusion

The individual trial results clearly show that Azadirachtin 1% EC gave high, persistent levels of control of aleuroids, equivalent to that achieved by the reference product. This was true in most trials, at all of the assessment timings.

Control of aphids in tomato crops

North-east zone

When applied at 3.0 L/ha in the North-east zone, Azadirachtin 1% EC achieved good to excellent control of aphids commonly found in tomato. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 3 assessments carried out, where statistical evaluation of the assessment was reported.

Table 3.2-19: North-east zone: Control obtained with 3.0 L/ha Azadirachtin 1% EC against aphids in tomato crops (3-14 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with Azadirachtin 1% EC at: Mean (min-max) 3.0 L/ha [30 g ai/ha]	Efficacy obtained with Mospilan ref. prod. at Mean (min-max) 1 N	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control >	=	<	Overall
PESSEV								
3 days after treatments	1	29.0 (-)	75.8 (-)	80.7 (-)			1	<
9 days after treatments	1	31.5 (-)	81.7 (-)	92.3 (-)			1	<
14 days after treatments	1	36.0 (-)	77.2 (-)	93.4 (-)			1	<

Mediterranean zone

When applied at 3.0 L/ha in the Mediterranean zone, Azadirachtin 1% EC achieved good to excellent control of aphids commonly found in tomato. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 6 assessments carried out, where statistical evaluation of the assessment was reported.

Table 3.2-20: Mediterranean zone: Control obtained with 3.0 L/ha Azadirachtin 1% EC against aphids in tomato crops (2-21 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with Azadirachtin 1% EC at: Mean (min-max) 3.0 L/ha [30 g ai/ha]	Efficacy obtained with Azadirachtin ref. prod. at Mean (min-max) 1 N [30 g ai/ha]	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control >	=	<	Overall
PESSEV								
2 days after treatments	2	49.9 (36.5-63.3)	93.0 (91.0-94.9)	95.2 (92.7-97.6)		1	1	=
7 days after treatments	2	37.5 (24.4-50.5)	96.1 (94.2-98.0)	97.7 (97.2-98.1)		2		=
21 days after treatments	2	19.8 (16.0-23.5)	100 (100-100)	99.2 (98.3-100)		2		=

Greenhouse

When applied at 3.0 L/ha in the greenhouse, Azadirachtin 1% EC achieved excellent control of aphids commonly found in tomato. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 3 assessments carried out, where statistical evaluation of the assessment was reported. Trials conducted under glasshouse represent a more challenging situation to control these insects since the controlled conditions inside glasshouses have better humidity and temperature for the development of insects. Thus, it is considered that glasshouse trials are valid to demonstrate efficacy in the field.

Table 3.2-21: Greenhouse: Control obtained with 3.0 L/ha Azadirachtin 1% EC against aphids in tomato crops (2-14 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with Azadirachtin 1% EC at: Mean (min-max) 3.0 L/ha [30 g ai/ha]	Efficacy obtained with Mospilan ref. prod. at Mean (min-max) 1 N	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control >	=	<	Overall
COUNT								
6 days after treatments	1	12.5 (-)	100 (-)	100 (-)		1		=
13 days after treatments	1	9.7 (-)	100 (-)	100 (-)		1		=
20 days after treatments	1	5.9 (-)	100 (-)	100 (-)		1		=

Conclusion

The individual trial results clearly show that Azadirachtin 1% EC gave high, persistent levels of control of aphids, equivalent to that achieved by the reference product. This was true in most trials, at all of the assessment timings.

Control of thrips in tomato crops

Mediterranean zone

When applied at 3.0 L/ha in the Mediterranean zone, Azadirachtin 1% EC achieved good to excellent control of thrips commonly found in tomato. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 6 assessments carried out, where statistical evaluation of the assessment was reported.

Table 3.2-22: Mediterranean zone: Control obtained with 3.0 L/ha Azadirachtin 1% EC against thrips in tomato crops (2-8 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with Azadirachtin 1% EC at: Mean (min-max) 3.0 L/ha [30 g ai/ha]	Efficacy obtained with Azadirachtin ref. prod. at Mean (min-max) 1 N [30 g ai/ha]	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control >	=	<	Overall
PESINC								
2 days after treatments	1	67.0 (-)	71.6 (-)	72.0 (-)		1		=
4 days after treatments	1	74.3 (-)	73.0 (-)	73.3 (-)		1		=
8 days after treatments	1	81.0 (-)	69.5 (-)	69.7 (-)		1		=
PESSEV								
2 days after treatments	1	44.8 (-)	70.1 (-)	72.0 (-)		1		=
4 days after treatments	1	83.8 (-)	71.9 (-)	72.2 (-)		1		=
8 days after treatments	1	156.3 (-)	69.4 (-)	70.3 (-)		1		=

Conclusion

The individual trial results clearly show that Azadirachtin 1% EC gave high, persistent levels of control of thrips, equivalent to that achieved by the reference product. This was true in most trials, at all of the assessment timings.

Control of collorado beetle in potato crops

Maritime zone

When applied at 2.5 L/ha in the Maritime zone, Azadirachtin 1% EC achieved moderate to good control of collorado beetle commonly found in potato. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 6 assessments carried out, where statistical evaluation of the assessment was reported.

Table 3.2-23: Maritime zone: Control obtained with 2.5 L/ha Azadirachtin 1% EC against collorado beetle in potato crops (3-10 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with Azadirachtin 1% EC at: Mean (min-max) 2.5 L/ha [25 g ai/ha]	Efficacy obtained with Azadirachtin ref. prod. at Mean (min-max) 1 N [30 g ai/ha]	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control >	=	<	Overall
COUINS								
2-3 days after treatments	3	88.5 (15.5-162)	71.7 (55.2-90.5)	64.4 (45.1-88.5)	2	1		>
9-10 days after treatments	3	22.5 (11.0-34.0)	62.2 (38.3-75.5)	64.5 (35.3-100)	1	1	1	=

North-east zone

When applied at 2.5 L/ha in the North-east zone, Azadirachtin 1% EC achieved good to excelent control of collorado beetle commonly found in potato. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 20 assessments carried out, where statistical evaluation of the assessment was reported.

Table 3.2-24: North-east zone: Control obtained with 2.5 L/ha Azadirachtin 1% EC against collorado beetle in potato crops (3-15 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with Azadirachtin 1% EC at: Mean (min-max) 2.5 L/ha [25 g ai/ha]	Efficacy obtained with Mospilan 20 SP ref. prod. at Mean (min-max) 1 N	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control >	=	<	Overall
COUINS								
3 days after treatments	6	7.83 (2.6-11.8)	78.2 (40.0-91.3)	76.9 (32.7-95.4)	1	4	1	=
7-9 days after treatments	6	8.21 (1.6-13.4)	74.5 (23.8-100)	82.6 (51.7-100)		4	2	=
10-15 days after treatments	2	2.3 (1.1-3.5)	61.7 (31.0-92.4)	67.8 (37.5-98.1)		1	1	=
PESINC								
3 days after treatments	3	44.9 (-)	98.6 (-)	100 (-)		1		=
8 days after treatments	3	44.9 (-)	100 (-)	100 (-)		1		=

South-east zone

When applied at 2.5 L/ha in the South-east zone, Azadirachtin 1% EC achieved moderate to very good control of collorado beetle commonly found in potato. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 6 assessments carried out, where statistical evaluation of the assessment was reported.

Table 3.2-25: South-east zone: Control obtained with 2.5 L/ha Azadirachtin 1% EC against collorado beetle in potato crops (3-12 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with Azadirachtin 1% EC at: Mean (min-max) 2.5 L/ha [25 g ai/ha]	Efficacy obtained with Azadirachtin ref. prod. at Mean (min-max) 1 N [30 g ai/ha]	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control >	=	<	Overall
COUINS								
3 days after treatments	2	29.0 (21.3-36.7)	55.9 (50.7-61.0)	51.9 (47.9-55.9)	1	1		=
7 days after treatments	2	26.5 (18.1-34.8)	77.1 (71.3-82.8)	79.2 (73.0-85.3)		2		=
12 days after treatments	2	18.2 (7.4-29.0)	86.2 (84.5-87.8)	83.0 (78.4-87.6)	1	1		=

Mediterranean zone

When applied at 2.5 L/ha in the Mediterranean zone, Azadirachtin 1% EC achieved good control of collorado beetle commonly found in potato. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 10 assessments carried out, where statistical evaluation of the assessment was reported.

Table 3.2-26: Mediterranean zone: Control obtained with 2.5 L/ha Azadirachtin 1% EC against collorado beetle in potato crops (2-21 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with Azadirachtin 1% EC at: Mean (min-max) 3.0 L/ha [30 g ai/ha]	Efficacy obtained with Azadirachtin ref. prod. at Mean (min-max) 1 N [30 g ai/ha]	Efficacy obtained with National ref. prod. at Mean (min-max) 1 N	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control >	=	<	Overall
PESSEV									
3 days after treatments	3	33.0 (25.2-44.0)	68.6 (59.4-73.4)	73.1 (72.7-73.5)	60.1 (-)		3		=
9 days after treatments	3	29.6 (13.0-38.1)	70.3 (69.3-70.8)	71.0 (70.7-71.2)	78.7 (-)		2	1	=
PESINC									
3 days after treatments	2	71.9 (67.8-76.0)	70.1 (69.8-70.3)	70.3 (70.1-70.4)	-		2		=
9 days after treatments	2	88.8 (87.3-90.3)	67.8 (67.4-68.2)	68.2 (67.8-68.6)	-		2		=

Conclusion

The individual trial results clearly show that Azadirachtin 1% EC gave high, persistent levels of control of collorado beetle, equivalent to that achieved by the reference product. This was true in most trials, at all of the assessment timings.

Control of aphids in ornamental crops

Maritime zone

When applied at 3.0 L/ha in the Maritime zone, Azadirachtin 1% EC achieved good control of aphids commonly found in ornamentals. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 3 assessments carried out, where statistical evaluation of the assessment was reported.

Table 3.2-27: Maritime zone: Control obtained with 3.0 L/ha Azadirachtin 1% EC against aphids in ornamental crops (2-10 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with: Azadirachtin 1% EC at: Mean (min-max) 3.0 L/ha [30 g ai/ha]	Efficacy obtained with: Azadirachtin ref. prod. at Mean (min-max) 1 N [30 g ai/ha]	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control: >	=	<	Overall
COUINS								
2-3 days after treatments	2	21.3 (9.2-33.3)	60.0 (32.8-87.2)	71.7 (55.6-86.3)		1	1	=
10 days after treatments	1	44.5 (-)	87.2 (-)	69.7 (-)		1		=

Greenhouse

When applied at 3.0 L/ha in the greenhouse, Azadirachtin 1% EC achieved good to excellent control of aphids commonly found in ornamental. In all species evaluated, the effect achieved with Azadirachtin 1% EC was similar to the effect obtained with the azadirachtin reference product applied in the trials. Statistical evaluation supports this statement as, no significant differences were observed between the two tested products at any of the 2 assessments carried out, where statistical evaluation of the assessment was reported. Trials conducted under glasshouse represent a more challenging situation to control these insects since the controlled conditions inside glasshouses have better humidity and temperature for the development of insects. Thus, it is considered that glasshouse trials are valid to demonstrate efficacy in the field.

Table 3.2-28: Greenhouse: Control obtained with 3.0 L/ha Azadirachtin 1% EC against aphids in ornamental crops (4-7 DAA; mean and variation in % control as compared to untreated check).

EPPO Code	No. of trials	Mean (min-max)	Efficacy obtained with: Azadirachtin 1% EC at: Mean (min-max) 3.0 L/ha [30 g ai/ha]	Efficacy obtained with: Azadirachtin ref. prod. at Mean (min-max) 1 N	Efficacy obtained with: National ref. product. at Mean (min-max) 1 N	No. of trials Azadirachtin 1% EC at 30 g azadirachtin/ha is >, < or =, compared to the azadirachtin reference product at 30 g ai/ha. = : ± 5% control: >	=	<	Overall
PESINC									
4-7 days after treatments	2	22.5 (1.7-43.3)	93.9 (89.3-98.5)	82.5 (-)	98.6 (-)	1	1		=

Conclusion

The individual trial results clearly show that Azadirachtin 1% EC gave high, persistent levels of control of aphids, equivalent to that achieved by the reference product. This was true in most trials, at all of the assessment timings.

3.2.3.1 Overall conclusion

Based on the results of 28 field efficacy trials carried out in 2016 and 2017 season, the following can be concluded for the intended use control of aleuroids, aphids and thrips in tomato and ornamental and collorado beetle in potato with Azadirachtin 1% EC:

- Azadirachtin 1% EC applied at the proposed dose rate of 3.0 L/ha provides a high level of control of aleuroids, aphids and thrips commonly found in tomato and ornamental. Two applications of Azadirachtin 1% EC in all crops should be used to efficiently control all pests claimed on the label.
- Azadirachtin 1% EC applied at the proposed dose rate of 2.5 L/ha provides a high level of control of collorado beetle in potato. Two applications of Azadirachtin 1% EC in all crops should be used to efficiently control all pests claimed on the label.
- Compared to the azadirachtin reference product, the efficacy obtained with Azadirachtin 1% EC is comparable against all pests.
- Compared to the national reference products containing lambda cyhalothrin, the efficacy obtained with Azadirachtin 1% EC was comparable to inferior against the pests present in the trials.
- The trial results are considered valid for all intended South zone countries.

When treating the similar pests, the same level of control would be expected, in all GAP claimed crops and this has been seen in the trials. Therefore, for any label claims not adequately supported for one crop type, Sharda Cropchem España requests that the Zonal Evaluators reads across to the data on the other crop types and application timings.

This document also clearly demonstrates that the efficacy and cropsafetyness of Azadirachtin 1% EC is equivalent to the efficacy and cropsafetyness of the standard azadirachtin reference products against which Azadirachtin 1% EC was compared. The applicant therefore wishes to cite the original registrant's data on azadirachtin now out of protection in support of those recommendations on the draft label that are not adequately supported by the applicant's data and requests that the Zonal Evaluator extrapolate from those data.

Comments of zRMS:	Details of experiment are presented above by Applicant. All used methodology is in accordance to GEP rules (some exceptions will be presented later). Trials were conducted during two growing seasons (2016 and 2017), which is in line to appropriate EPPO standard. Applicant submitted in total 28 efficacy trials, carried out in the Maritime EPPO zone – 5 trials (DE-2, CZ-3); North-East EPPO zone – 8 trials (PL); South-East EPPO zone – 2 trials (HU) and Mediterranean EPPO zone – 6 trials (GR-3, IT-3), and 7 studies were performed in greenhouse (5-tomato, 2-ornametals). Applicant presented 9 efficacy trials carried out on tomato, 15 on potato and 4 trials performed on ornamental plants. Below we present the number of surveys carried out for each crop and pest, divided into climate zones in which they were done. ***Tomato:*** • **aphids:** ✓ MED EPPO zone – 2 trials were conducted in Grece (2 applications per season were studied). ✓ North-East EPPO zone – 1 trial was carried out in Poland (2 applications per season – 2 trials). ✓ South-East – lack of trials ✓ Mediterranean – lack of trials ✓ Greenhouse – 1 trial (performed in PL from N-E).

	During MED trials – MYZUPE as pest and during N-E trials (field, greenhouse) – APHIFA as pest was studied. Studied pest are in line to EPPO standard. AZA (SHA 103000 A) applied at the proposed dose rate of 3,0 L/ha provides a high level of control of aphids found in tomato. Trials conducted under glasshouse represent a more challenging situation to control studied insects since the controlled conditions inside glasshouses have better humidity and temperature for the development of insects. Thus, it is considered that glasshouse trials are valid to demonstrate efficacy in the field (but in the opinion of Evaluator only for field trials carried out in the same EPPO zone as greenhouse trials). Basis on this statement, **use against aphids on field tomato can be accepted only in Poland (2 trials: 1 field and 1 greenhouse). cMS from MED should decide if 2 field trials can be acceptable** (according to EPPO at least 3 trials should be submitted). Maybe, 2 field trials from MED and 1 greenhouse will sufficient for registration. **In the opinion of Evaluator, registration in MAR and S-E without any trial is not possible. However, final decision is left to each cMS.** Also, field use on tomato against aphids can be acceptable in the situation of not sufficient number of trials according to Article 51 (as tomato is a minor crop). • **thrips:** ✓ Maritime EPPO zone – lack of trials. ✓ North-East EPPO zone – lack of trials. ✓ South-East – lack of trials ✓ Mediterranean- 1 trial performed in IT (2 applications per seasons were studied). THRITB as pest was studied ✓ Greenhouse – lack of trials AZA applied at the proposed dose rate of 0,3 L/ha provides a high level of control of thrips found in tomato. In the opinion of Evalutor**, thrips should be excluded from GAP table and label project due to not enough number of trials. At least 2-3 efficacy trials for each EPPO zone should be presented. Only cMS, from MED should decide if only one trial cane be accepted.** • **aleuroides:** ✓ MED EPPO zone – lack of trials. ✓ North-East EPPO zone – lack of trials. ✓ South-East – lack of trials ✓ Mediterranean – lack of trials ✓ Greenhouse – 4 trials (performed in PL-1, FR-1, IT-2). 2 applications per season were studied. BEMITA and TRIAVA as pest were studied during trials. AZA (SHA 103000 A) applied at the proposed dose rate of 3,0 L/ha provides a high level of control of aleuroides found in tomato. In the opinion of Evalutor, **registration the plant protection product - AZA for application on tomato can not be accepted for field use (at least 2-3 efficacy trials carried out in each EPPO zone is required).** From N-E we have only one trial performed in greenhouse. It is not sufficient for support field registration. In the opinion of Evalutor**, according to submitted 4 trials carried out in greenhouse, use against aleuroides on tomato in greenhouse in MED, MAR, S-E and N-E can be accepted. However, use for greenhouse was not presented in GAP table and lable project by Applicant. According to GAP, this use for field trials should be excluded due to not enough trials. However, final decision is left to cMS.** ***Potato:*** • **Colorado beetle:**

	✓ Maritime EPPO zone – 3 trials (CZ-2, DE-1). 2 applications were studied. ✓ North-East EPPO zone – 7 trials (PL-6, LT-1). 2 application were studied. ✓ South-East – 2 trials (HU). 2 application were studied. ✓ Mediterranean – 3 trials (BR-1, IT-2). 2 application were studied. AZA applied at 2,5 L/ha provides a high level of control of a colorado beetle commonly found in potato. In all studies LPTNDE as pest was studied. On the basis on presented documentation, **registration in N-E should be possible. cMS from Maritime, S-E and MED EPPO zone should decide if limited number of trials can be acceptable.** ***Ornamental plants:*** • **aphids:** ✓ Maritime EPPO zone – 2 trials carried out in Czech Republic and Germany. NNNZZ was studied during trials. ✓ North-East EPPO zone – lack of trials. ✓ South-East – lack of trials. ✓ Mediterranean – lack of trials ✓ Greenhouse – 2 trials (PL). AZA applied at 3,0 L/ha provides a high level of control of aphids commonly found in ornamentals. On the basis on presented documentation, registration the application 2 times per season should be possible. **In the opinion of Evaluator, field use on ornamental against aphids will be possible only in MAR EPPO zone, if the cMS accepts deviations from the EPPO standards.** During field trials: METODR and DACTJA were studied as pest, which is not in line to appropriate EPPO standard. Tested organisms should be: non-winged stages of aphids such as *Myzus persicae* (MYZUPE), *Aphis fabae* (APHIFA), *Aulacorthum circumflexum* (MYZUCI), *Macrosiphoniella sanborni* (MACRCH), *Brachycaudus helichrysi* (ANURHE), *Macrosiphum rosae* (MACSRO), *Aphis gossypii* (APHIGO). ROSSS and CENIM as ornamental species of platnt were studied in field trials. According to EPPO standard (1/23) – *Aster spp*. (1ASTG), *Chrysanthemum indicum* (CHYIN), *Dahlia hybrids* (DAHHY), *Centaurium erythrea* (CTIER), *Centaurea spp*. (1CENG) should be studied. **Although a sufficient number of studies were presented for Poland (trials from neighbouring countries from MAR), the valid species to EPPO standards were not studied, so only, according to Article 51, this registration would be possible in the opinion of Evaluator.** **In N-E, MED and S-E should be presented at least 2-3 efficacy trials carried out on field on ornamentals against aphids. At this moment, without trials only registration according to Article 51 (without any field trials) is possible.** **On the basis on 2 greenhouse trials, ornamentals can be accepted in N-E, S-E, MED and MAR but only for greenhouse use against aphids.** During trials APHIFA as pest was studied, which is in line to EPPO 1/23. TOPMA and DAHHY where studied, which is not in line to regulations. According to EPPO 1/23 for greenhouse use following species shuld be studied: *Chrysanthemum indicum* (CHYIN), *Calceolaria herbeohybrid*a (CAZHY), *Rosa spp*. (1ROSG), *Asparagus spp*. (1ASPG), *Hibiscus spp*. (1HIBG), *Freesia spp*. (1FREG), goździk *Dianthus caryophyllus or Dianthus spp*. (DINCA, 1DING), *Pericallis x hybrida* (SENCR). So**, each cMS should decide if those deviations from EPPO standards can be acceptable. In Poland, ornamental plants should be excluded from GAP table and label project. Although a sufficient number of studies were presented for N-E, the correct species were not studied in these studies, so only, according to Article 51, this registration would be possible in the opinion of Evaluator.**

3.3 Information on the occurrence or possible occurrence of the development of resistance (KCP 6.3)

3.3.1 Summary and Conclusions

The following dossier section follows EPPO standard PP 1/213(3) *Resistance risk analysis* in particular point 6. *Registration requirements* of the standard.

Introduction
Resistance to crop protection chemicals is a natural biological phenomenon that occurs in insects, weeds and fungi. It usually becomes evident after the repeated use of a particular pesticide selects the naturally-occurring resistant strains within the wild population and allows them to multiply over several seasons until they become dominant in the population and pose a control problem.
The insect-resistant population develops because the sensitive population is suppressed and the rare insecticide-resistant individual is allowed to multiply and occupy the biological niche previously filled by the sensitive population. An increase in the frequency of such resistant strains may result in loss of control. As a general principle, resistance develops at different rates depending on the pathogen type, nature of the infestation and use pattern of the insecticide.
Reports of the appearance of resistant strains in laboratory studies do not necessarily imply that any loss of control is expected in the field. Likewise, the appearance of less-sensitive strains in the field does not always result in failure of insect control. When the frequency of resistant individuals is low and/or the level of resistance is moderate, insecticide applications in most cases will provide satisfactory control.

To avoid the misinterpretation of potential and/or possible resistance cases, the term resistance will be limited to situations where the conditions in both (a) and (b) below are met:

(a) the development of resistance leads to failure of control under practical field conditions following application of a insecticide correctly and according to the label and

(b) a demonstration that a loss of control is due to the presence of pathogenic strains with reduced insecticide sensitivity..

The Registration of Azadirachtin 1% EC is endorsed.

3.3.2 Mode of action

According to the insecticide resistance action committee (IRAC), azadirachtin has compounds of unknown or uncertain MoA.

3.3.3 Mechanism- and evidence of resistance

According to the insecticide resistance action committee (IRAC), azadirachtin has compounds of unknown or uncertain MoA, and various studies have been carried out for many years, and no mechanism and evidence of resistance was clearly observed when the insecticide azadirachtin was applied.

3.3.3.1 Cross-resistance

In many cases, not only does resistance render the selecting compound ineffective, it also confers cross-resistance to other chemically related compounds. This is because compounds within a specific chemical group usually share a common target site within the pest and thus share a common MoA. It is common for resistance to develop that is based on a genetic modification of the target site. When this happens, the interaction of the selecting compound with its target site is impaired and the compound loses its pesticidal

efficacy. Because all compounds within the chemical group share a common MoA, there is a high risk that existing or developing target-site resistance will confer cross-resistance to all compounds in the same group.

3.3.3.2 Sensitivity data

Insects vary in their sensitivity towards insecticides both between and within populations, and this natural variation should be understood before shifts in sensitivity can be assessed. Azadirachtin is a insecticide has been tested and used worldwide for more than 20 years and it is therefore difficult to find unexposed insect populations. No true base line sensitivity data can therefore be established.

3.3.4 Use pattern

Azadirachtin 1% EC is based on the activity of azadirachtin. In the EU Central zone, the formulation is proposed for use against aleuroids, aphids and thrips in tomato (BBCH 12-85) and ornamental (BBCH 12-89) and against collorado beetle in potato (BBCH 12-91). The recommended dose rate is 3.0 L/ha (30 g ai/ha) in tomato and ornamental and at 2.5 L/ha (25g ai/ha) in potato. The maximum number of applications is two applications per growing season.

3.3.5 Resistance Risk assessment of unrestricted use pattern

Agronomic practice
Not applicable

The plant protection product
For optimum insect control, azadirachtin is applied at the rates recommended on the proposed label. These have been shown to be the minimum effective dose for the major pest targets.

Unrestricted Use pattern
In the absence of any potential resistance risk and in the absence of any other restrictions on the GAP (residues, toxicology etc.) the unrestricted use pattern for azadirachtin would be season long usage with an unrestricted number of applications.

Resistance risk assessment of unrestricted use pattern
Overall it is clear that the unrestricted use of azadirachtin presents an unacceptable resistance risk and therefore modifiers as part of a Management Strategy are proposed.

3.3.6 Acceptability of the resistance risk

Without any precautions, the resistance risk is unacceptable. However; taking the right precautions and following Good Agricultural Practise, the risk is acceptable. Should resistant populations arise, control could be achieved through use of alternative products.

3.3.7 Management Strategy

Good Agricultural Practices and Good Plant Protection Practices (EPPO Standard 2/1 (2)) should be the followed in the pests management strategy.

Azadirachtin 1% EC should be used in alternation with insecticides comprising different modes of action to avoid the build-up of resistant biotypes and cross resistance. Do not make more than two applications.

As the unmodified use pattern is considered unacceptable a number of modifiers are proposed which are entirely in accordance with the general recommendations.

- Use in alternation with insecticides with a different mode of action
- Use as recommended on the label. Do not use reduced doses.

3.3.8 Implementation of the management strategy

Information on the management of resistance and the specific Resistance Management Strategy for azadirachtin is disseminated by a number of routes including, but not exclusively:

- Product label has a clear statement regarding resistance risk and the management strategy
- Pack inserts- for general information or to address a particular issue in a specific geographical area were it to occur.
- Leaflets available at, and distributed by distributors/wholesalers/merchants
- Information released by national and local advisory services re. monitoring
- Training for distributors/wholesalers/merchants and farmer groups

Links from company web sites to local Resistance working groups for information and advic.

3.3.9 Monitoring, reporting and reaction to changes in performance

Monitoring of performance

Where performance is significantly less than expected (relative to study results presented in section 6.1.3) and where no other explanation can be found for the reduced performance e.g. application errors, then samples may be taken for sensitivity testing. Where testing is carried out it will be conducted at laboratories experienced in carrying out such testing and using methods recommended by the authorities.

Analysis of performance-related complaints

Where no other reason for a failure in performance can be identified, samples may be taken for testing as described above

Where resistance is confirmed as the cause for loss of performance this will be reported to the authorities on an annual basis or as required.

Containment plan

The above recommendations will be adjusted as needed depending on the success of the proposed strategy. In the event that practical resistance should occur on any significant scale, Sharda's plan for containing the further development or spread of resistance includes a number of possible actions on a temporary or permanent basis, including but not exclusively:

- Recommendations to repeat the treatment with insecticides from alternative mode of action groups
- Recommendation to use only in a programme e.g. before or after an application of an insecticide from a different mode of action group.

Normally any action taken would be in consultation with the relevant authorities.

Comments of zRMS:	According to the insecticide resistance action committee (IRAC), azadirachtin has compounds of unknown or uncertain MoA, and various studies have been carried out for many years, and no mechanism and evidence of resistance was clearly observed when the insecticide azadirachtin was applied. For optimum insect control, azadirachtin is applied at the rates recommended on the proposed label. These have been shown to be the minimum effective dose for the major pest targets. In the absence of any potential resistance risk and in the

	absence of any other restrictions on the GAP (residues, toxicology etc.) the unrestricted use pattern for azadirachtin would be season long usage with an unrestricted number of applications. Overall it is clear that the unrestricted use of azadirachtin presents an unacceptable resistance risk and therefore modifiers as part of a Management Strategy are proposed. Evaluator accepted the strategy management about possible development of resistance or cross-resistance proposed by Applicant: use alternately insecticides with different modes of action, use as recommended on the label; do not use reduced doses. Recommendation to use only in a programme e.g. before or after an application of an insecticide from a different mode of action group. Since the agronomic factors influencing the risk of resistance development tend to vary between the member states, the individual and detailed assessment of the resistance risk (Evaluation of the Agronomic risk of resistance, Management of resistance, Use pattern, Proposed Risk Modifiers) has to be finalised on national level.

3.4 Adverse effects on treated crops (KCP 6.4)

As Azadirachtin 1% EC is an insecticide, no specific studies are required as long as in the efficacy trials no negative effects are observed. The crop safety of applying Azadirachtin 1% EC at the recommended rates in tomato, potato and ornamental was evaluated in 28 efficacy trials and 14 selectivity trials.

Table 3.4-1: Presentation of selectivity trials

Use(s) *	Country	Years	Type of trial**	Number of trials (number of valid trials)					GEP, non-GEP, official***	Comments (any other relevant information)
				EPPO zone				Gr.		
				MAR	MED	S-E	N-E			
Tomato	France	2016	S + Y	-	1 (1)	-	-	-	GEP	
	Italy	2016	S + Y	-	1 (1)	-	-	-	GEP	
	Poland	2016	S + Y	-	-	-	1 (1)	1 (1)	GEP	
	Czech Rep.	2016	S + Y	1 (1)	-	-	-	-	GEP	
			Total, tomato;	**1 (1)**	**2 (2)**	-	1 (1)	1 (1)		
Potato	Czech Rep.	2016	S + Y	1 (1)	-	-	-	-	GEP	
	Lithuania	2016	S + Y	-	-	-	1 (1)	-	GEP	
	Hungary	2016	S + Y	-	-	1 (1)	-	-	GEP	
			Total, potato;	**1 (1)**		**1 (1)**	1 (1)			
Ornamental	Germany	2017	S + Y	2 (2)	-	-	-	1 (1)	GEP	
	Czech Rep.	2016	S + Y	1 (1)	-	-	-	-	GEP	
	Poland	2016	S + Y	-	-	-	1 (1)	1 (1)	GEP	
			Total, ornamental;	**3 (3)**	-	-	**1 (1)**	**2 (2)**		
			Total, all crops;	**5 (5)**	**2 (2)**	**1 (1)**	**3 (3)**	**3 (3)**		

Table 3.4-2: Details on selectivity trials methodology

Guidelines	General guidelines	EPPO PP 1/152 (4), PP 1/181 (4), PP 1/135(4)

	Specific guidelines	Tomato: EPPO PP 1/230(1), PP 1/36(3), Potato: EPPO PP 1/12(4) Ornamentals: EPPO PP 1/23(2)
Experimental design	Plot design	RCBD (14)
	Plot size	10-121 m²
	Number of replications	4 (14)
Crop	Trials per crop	Tomato (5), i.e. LYPES Potato (3): SOLTU Ornamental (6): FUCSS, NNNZZ, PAOLA, ROSCH, ROSSS, CENIM
	Varieties per crop	Tomato: Perfectpeel, Roxanne, Vulcan F1, Berberana, Tolstoj Potato: Secura, Adela, Innovator Ornamental: Sonnewind, Sea Foam, Mixed colors, Sorbet, Shadow dancer, Gladiolus Fire Ruffle
	Sowing period	Tomato: April 15th to July 20th Potato: April 21st to August 11th Ornamental: April 3nd to June 10th
Application	Crop stage (BBCH)* at application	Tomato: BBCH 27-85 Potato: BBCH 37-62 Ornamental: BBCH 60-70
	Timing Pest stage at appl. (1)	Tomato: June 17th to September 1st Potato: June 8th to June 22th Ornamental: June 14th to July 25th BBCH 27-85 – for details on the growth stage of the specific pests at application, please refer to summary tables in Appendix 5
	Number of appl. Intervals between appl.	2 (14)
	Spray volumes	500-1000 L/ha
Assessment	Assessment types	- Visual estimation of biomass reduction per plot compared to 'untreated' ('untreated' = 0 % control); total control = 100 % control) or calculated, based on pests counts (COUNT) in a defined area, as compared to the untreated check.
	Assessment dates	Efficacy: 2 to 21 DAT
Other relevant information	Soil type	Light to heavy soils
	Natural / artificial innoculation…	Natural
	Field / Greenhouse...	Field (11) and Greenhouse (3)

3.4.1 Phytotoxicity to host crop (KCP 6.4.1)

The crop safety of Azadirachtin 1% EC was assessed in 28 efficacy trials (6 MED, 8 N-E, 5 MAR, 2 S-E and 7 greenhouse) where Azadirachtin 1% EC was applied at 1.75 L/ha to 3.0 L/ha, and 14 selectivity trials (2 MED, 5 MAR, 3 N-E, 1 S-E and 1 greenhouse) where Azadirachtin 1% EC was applied at 3.0 L/ha and 6.0 L/ha.

In tomato, the crop safety of Azadirachtin 1% EC was assessed in 9 efficacy trials (3 MED, 1 N-E and 5 greenhouse) where Azadirachtin 1% EC was applied at 2.0 L/ha, 2.5 L/ha and 3.0 L/ha and in 5 selectivity trials (2 MED, 1 N-E, 1 MAR and 1 greenhouse) where Azadirachtin 1% EC was applied at 3.0 L/ha and 6.0 L/ha.

In potato, the crop safety of Azadirachtin 1% EC was assessed in 15 efficacy trials (3 MED, 3 MAR, 7 N-E and 2 S-E) where Azadirachtin 1% EC was applied at 1.75 L/ha to 3.0 L/ha and in 3 selectivity trials (1 MAR, 1 N-E and 1 S-E) where Azadirachtin 1% EC was applied at 3.0 L/ha and 6.0 L/ha.

In ornamental, the crop safety of Azadirachtin 1% EC was assessed in 4 efficacy trials (2 MAR and 2 greenhouse) where Azadirachtin 1% EC was applied at 2.0 L/ha, 2.5 L/ha and 3.0 L/ha and in 6 selectivity trial (3MAR, 1N-E and 2 greenhouse) where Azadirachtin 1% EC was applied at 3.0 L/ha and 6.0 L/ha.

The trials were conducted in the Maritime EPPO zone (10; i.e. Czech Republic (6) and Germany (4)), the North-east EPPO zone (11, i.e. Poland (9) and Lithuania (2)), the South-east EPPO zone (3; i.e. Hungary), the Mediterranean EPPO zone (8, i.e. Greece (3), France (1) and Italy (4)) and greenhouse (10) in 2016 and 2017 season, to evaluate the crop safetyness of Azadirachtin 1% EC in tomato, potato and ornamental.

3.4.1.1 Tomato

Crop phytotoxicity was evaluated in efficacy and selectivity trials where Azadirachtin 1% EC was applied at growth stages ranging from BBCH 27 to BBCH 85, at the rate of 2.0 to 6.0 L/ha in tomato. 6.0 L/ha corresponds to 200% of the proposed dose rate. Crop phytotoxicity was assessed in all trials at various intervals.

Phytotoxicity in tomato trials, Maritime EPPO zone

One selectivity trial was conducted in the Maritime EPPO zone to assess the crop safety of Azadirachtin 1% EC when applied as recommended in tomato. The trial was conducted on commercially available variety.

No adverse effects in regard to phytotoxicity were observed in the selectivity trials conducted in the Maritime EPPO zone.

Phytotoxicity in tomato trials, North-east EPPO zone

One efficacy and one selectivity trials were conducted in the North-east EPPO zone to assess the crop safety of Azadirachtin 1% EC when applied as recommended in tomato. The trials were conducted on commercially available varieties.

No adverse effects in regard to phytotoxicity were observed in any of the efficacy and selectivity trials conducted in the North-east EPPO zone.

Phytotoxicity in tomato trials, Mediterranean EPPO zone

Three efficacy and two selectivity trials were conducted in the Mediterranean EPPO zone to assess the crop safety of Azadirachtin 1% EC when applied as recommended in tomato. The trials were conducted on commercially available varieties.

No adverse effects in regard to phytotoxicity were observed in any of the three efficacy and two selectivity trials conducted in the Mediterranean EPPO zone.

Phytotoxicity in tomato trials, Greenhouse

Five efficacy and one selectivity trials were conducted in greenhouse to assess the crop safety of Azadirachtin 1% EC when applied as recommended in tomato. The trials were conducted on commercially available varieties.

No adverse effects in regard to phytotoxicity were observed in any of the six efficacy trials conducted in the greenhouse.

3.4.1.2 Potato

Crop phytotoxicity was evaluated in efficacy and selectivity trials where Azadirachtin 1% EC was applied at growth stages ranging from BBCH 12 to BBCH 91, at the rate of 1.75 to 6.0 L/ha in potato. 6.0 L/ha corresponds to 240% of the proposed dose rate. Crop phytotoxicity was assessed in all trials at various intervals.

Phytotoxicity in potato trials, Maritime EPPO zone

Two efficacy and one selectivity trials were conducted in the Maritime EPPO zone to assess the crop safety of Azadirachtin 1% EC when applied as recommended in potato. The trials were conducted on commercially available varieties.

No adverse effects in regard to phytotoxicity were observed in any of the two efficacy and one selectivity trials conducted in the Maritime EPPO zone.

Phytotoxicity in potato trials, North-east EPPO zone

Seven efficacy and one selectivity trials were conducted in the North-east EPPO zone to assess the crop safety of Azadirachtin 1% EC when applied as recommended in potato. The trials were conducted on commercially available varieties.

No adverse effects in regard to phytotoxicity were observed in any of the seven efficacy and one selectivity trials conducted in the North-east EPPO zone.

Phytotoxicity in potato trials, South-east EPPO zone

Two efficacy and one selectivity trials were conducted in the South-east EPPO zone to assess the crop safety of Azadirachtin 1% EC when applied as recommended in potato. The trials were conducted on commercially available varieties.

No adverse effects in regard to phytotoxicity were observed in any of the two efficacy and one selectivity trials conducted in the South-east EPPO zone.

Phytotoxicity in potato trials, Mediterranean EPPO zone

Three efficacy trials were conducted in the Mediterranean EPPO zone to assess the crop safety of Azadirachtin 1% EC when applied as recommended in potato. The trials were conducted on commercially available varieties.

No adverse effects in regard to phytotoxicity were observed in any of the three efficacy trials conducted in the Mediterranean EPPO zone.

3.4.1.3 Ornamental

Crop phytotoxicity was evaluated in efficacy and selectivity trials where Azadirachtin 1% EC was applied at growth stages ranging from BBCH 12 to BBCH 85, at the rate of 2.0 to 6.0 L/ha in ornamental. 6.0 L/ha corresponds to 200% of the proposed dose rate. Crop phytotoxicity was assessed in all trials at various intervals.

Phytotoxicity in ornamentals trials, Maritime EPPO zone

Two efficacy trials and three selectivity trials were conducted in the maritime zone to assess the crop safety of Azadirachtin 1% EC when applied as recommended in ornamental. The trials were conducted on commercially available varieties.

No adverse effects in regard to phytotoxicity were observed in any of the five trials conducted in the Maritime EPPO zone.

Phytotoxicity in ornamentals trials, Greenhouse

One selectivity trial was conducted in the North-east EPPO zone to assess the crop safety of Azadirachtin 1% EC when applied as recommended in ornamental. The trials were conducted on commercially available varieties.

No adverse effects in regard to phytotoxicity were observed in the efficacy trial conducted in the North-east EPPO zone.

3.4.1.4 Overall conclusion

Azadirachtin 1% EC applied at the recommended dose rate was perfectly crop safe and did not cause phytotoxicity in any of the trials conducted on tomato, potato and ornamental.

As the data on tomato, potato and ornamental show, the crop safety and efficacy of Azadirachtin 1% EC is equivalent to that of the Azadirachtin reference product. For recommendations claimed on the draft Azadirachtin 1% EC label not adequately supported by the applicant's trials data, Sharda wishes to cite the original registrant's data on azadirachtin now out of protection and requests that the evaluators extrapolate from those data.

Table 3.4-3: Phytotoxicity of test- and reference product

Number of trials with…		**Efficacy trials (28 trials)**					
		Test product			**Standard 1**		
		1N	**1N**	**1N**	**1N**	**1N**	**1N**
		Tomato	Potato	Ornamental	Tomato	Potato	Ornamental
Maximum of phytotoxicity recorded during the trials	0% to 5%	9	15	4	9	15	4
	>5% to 10%	0	0	0	0	0	0
	>10% to 15%	0	0	0	0	0	0
	>15 %	0	0	0	0	0	0
Level of symptoms at the last assessments	0% to 5%	9	15	4	9	15	4
	>5% to 10%	0	0	0	0	0	0
	>10% to 15%	0	0	0	0	0	0
	>15 %	0	0	0	0	0	0

Table 3.4-4: Phytotoxicity of test- and reference product

Number of trials with…		**Selectivity trials (14 trials)**					
		Test product			**Standard 1**		
		2N	**2N**	**2N**	**2N**	**2N**	**2N**
		Tomato	Potato	Ornamental	Tomato	Potato	Ornamental
Maximum of phytotoxicity recorded during the trials	0% to 5%	5	3	6	5	3	6
	>5% to 10%	0	0	0	0	0	0
	>10% to 15%	0	0	0	0	0	0
	>15 %	0	0	0	0	0	0
Level of symptoms at the last assessments	0% to 5%	5	3	6	5	3	6
	>5% to 10%	0	0	0	0	0	0

Number of trials with…		Selectivity trials (14 trials)					
		Test product			Standard 1		
		2N	2N	2N	2N	2N	2N
	>10% to 15%	0	0	0	0	0	0
	>15 %	0	0	0	0	0	0

Comments of zRMS:	Both EU Directive 91/414 (EU, 1991) and EPPO PP 1/226 (3) – Number of efficacy trials requires testing phytotoxicity at normal (N) and double (2N) recommended dose. However, EPPO 1/135 (3) – Phytotoxicity assessment states: 'EPPO Standards on fungicides, insecticides and plant growth regulators, on the other hand, include only a relatively simple special section on phytotoxicity assessment, because, for these types of plant protection products, phytotoxic effects will be less frequent'. Selectivity trials were not required, which is in accordance with EPPO 1/135 (3). However, Apllicant submitted in total 14 selectivity trials. For tomato in total 5 selectivity trials were submitted (MAR-1, MED-2, N-E-1, greenhouse trial-1), for potato – in total 4 trials (MAR-1, S-E-1, N-E-1) and for onrnamnetal plants – in total 6 trials (MAR-3, N-E-1, greenhouse trials-2) Phytotoxicity was assessed during 28 efficacy and 14 selectivity trials. Detailed information's are presented by Applicant. No pytotoxicity symptoms caused by a tested product at the proposed dose rate. No adverse effects in regard to phytotoxicity and selelctivity were observed in any of the submitted trials. The applicant was notified that according to PP 1/226 at least 6 trials from each climatic zone are required. cMS should decide if submitted documentation is acceptable for registration AZA. For Poland (N-E EPPO zone) submitted documentation is sufficient for potatoes, tomatoes and ornamental plants (however due to efficacy trials, they can be registered only in line to Article 51). cMS should decide if presented documentation is acceptable. Based on similar selectivity of tested product and reference, the applicant wishes to cite the original registrant's data on azadirachtin now out of protection in support of those recommendations on the draft label that are not adequately supported. Such extrapolations should be considered by individual member states on a national level based on current registration, data protection and experience with similar azadirachtin products. **AZA applied at the recommended dose rate was perfectly crop safe and did not cause phytotoxicity in any of the trials conducted on tomato, potato and ornamentals.**

3.4.2 Effect on the yield of treated plants or plant product (KCP 6.4.2)

Seven selectivity trials were conducted with the same formulation currently under registration, i.e. Azadirachtin 1% EC, in the Maritime EPPO zone (2, i.e. Czech Republic), the North-east EPPO zone (2, i.e. Poland and Lithuania) and the Mediterranean EPPO zone (3, i.e. S-France (2) and Italy (1)) to evaluate the effect of Azadirachtin 1% EC on the quality of the harvested crop of tomato, potato and ornamental.

Tomato

Two selectivity trials in tomato were harvested. The trials were conducted in Czech Republic, Poland, S-France and Italy in 2016. In the selectivity trials, Azadirachtin 1% EC was applied at 3.0 to 6.0 L/ha. The trials were sprayed at crop growth stages at BBCH 52-81.

Potato

Three selectivity trials in potato were harvested. The trials were conducted in Lithuania, Czech Republic and Hungary in 2016. In the selectivity trials, Azadirachtin 1% EC was applied at 3.0 to 6.0 L/ha. The trials were sprayed at crop growth stage at BBCH 59.

Conclusion

Azadirachtin 1% EC applied at the proposed dose rate, at a range of growth stages within or occasionally beyond the label recommended range, in tomato and potato did not affect crop yield nor the quality of the crop yield significantly in any of the 7 trials harvested. In all selectivity trials, Azadirachtin 1% EC applied at dose rates higher than the recommended rate did not significantly affect the crop yield.

Furthermore, the data obtained in trials harvested demonstrate that Azadirachtin 1% EC is as safe to the crop as the reference products used in the trials.

For recommendations on the label not sufficiently supported with trials harvested, the applicant wishes to bridge to the trials conducted in tomato and potato where harvest data demonstrated the safe use following application of Azadirachtin 1% EC as recommended. Furthermore, the data presented in this BAD also clearly demonstrates that the efficacy and crop safety of Azadirachtin 1% EC is equivalent to the standard azadirachtin formulated product to which it was compared. The applicant therefore wishes to cite the original registrant's data on azadirachtin now out of protection in support of those recommendations on the draft label that are not adequately supported by the applicant's data and requests that the Zonal Evaluator extrapolate from those data.

Comments of zRMS:	Active substance comprising in this product has been applied for many years, not only in Poland but also in the other countries of Europe. There is absence of any evidence concerning the influence of insecticide AZA on yield. According to the above statement no additional research are required in this range, in the opinion of Evaluator.

3.4.3 Effects on the quality of plants or plant products (KCP 6.4.3)

Trials with quality results are not required for Azadirachtin 1% EC.

Comments of zRMS:	Active substance comprising in this product has been applied for many years, not only in Poland but also in the other countries of Europe. There is absence of any evidence concerning the influence of insecticide AZA on the quality of yield. According to the above statement no additional research are required in this range, in the opinion of Evaluator.

3.4.4 Effects on transformation processes (KCP 6.4.4)

There are no indications that the use of azadirachtin will have influence on possible transformation processes. It is therefore expected that Azadirachtin 1% EC, when applied as recommended in the GAP claimed uses will not cause any unacceptable adverse effects on transformation processes.

Furthermore, the residue data (see Part B Section 7) clearly demonstrate that, at the proposed application rates, no azadirachtin nor its metabolites above the LOQ (= limit of quantification) are found in any of the tested crops. In case of undetectable residues no special studies are required according to the EPPO guideline PP 1/243(1).

Finally, it should be noted that azadirachtin has been used for a long time as a insecticide. Since the market introduction no effects on transformation processes have been recorded for any of these products, nor

do azadirachtin containing products have any label restrictions concerning their use on crops destined for processing.

Comments of zRMS:	ZRMs agree with Applicant. Since the market introduction no effects on transformation processes have been recorded for any of these products, nor no azadirachtin containing products have any label restrictions concerning their use on crops destined for processing.

3.4.5 Impact on treated plants or plant products to be used for propagation (KCP 6.4.5)

Azadirachtin 1% EC is composed of azadirachtin, which has been widely used for several years on the GAP claimed crops, without identifying any issues in regards to ability of grains of treated plants to germinate.

According to the Guideline EPPO 1/135(4), it is only necessary to study the insecticide in seeds and tubers only where the plant protection product has systemic activity, is applied close to harvest and some phytotoxic effects are seen in some crops, therefore in our case it is not required.

Comments of zRMS:	Information provided by the Applicant was limited due to fact that plant protection product – AZA is not identifying any issues in regards to ability of grains of treated plants to germinate. Also, no phytotoxicity symptoms occurring during the field trials suggested that product application in accordance with label recommendation has no negative impact on parts of plant used for propagating purposes. Evaluator agree with Aplicant that according to the Guideline EPPO 1/135(4), it is only necessary to study the insecticide in seeds and tubers only where the plant protection product has systemic activity, is applied close to harvest and some phytotoxic effects are seen in some crops, therefore in our case it is not required.

3.5 Observations on other undesirable or unintended side-effects (KCP 6.5)

3.5.1 Impact on succeeding crops (KCP 6.5.1)

Azadirachtin is registered as an insecticide for protection of different crops in a number of products already on the market. Long-standing practical experiences, since the active substance was first introduced into the market, has shown that within the scope of normal crop rotation no res-trictions on succeeding crops do exist. In addition, the active substance is also used as foliar in-secticide. There have been no cases of negative impacts on succeeding crops even with foliar applications.
Azadirachtin lack any herbicidal activity. This and the fact that the overall concentration in the soil following planting grains treated with Azadirachtin 1% EC at storage is very low, are two more reasons to underline that Azadirachtin 1% EC does not have any impact on succeeding crops.

Conclusion

Based on experiences with the solo active ingredient, the risk that the product Azadirachtin 1% EC has negative impact on succeeding crops, if applied at the proposed GAP for protection against insect feeding, is regarded to be negligible. Thus the recommendation of no restrictions on following crops after sowing seeds treated with Azadirachtin 1% EC is justified.

Comments of zRMS:	Applicant did not provide any new data and did not submit the results of the trials on possible impact on succeeding crops. However, a review of available literature

	as well as the lack of phytotoxicity symptoms recorded during the field trials suggest that product application in accordance with label recommendation shall not adversely impact on succeeding crops. What is important, active substance comprising in this product have been applied for many years not only in Poland but also in other countries of Europe. Based on the absence of any adverse effects in typical cropping situations, it was concluded that the insecticide AZA poses no risk to succeeding crops.

3.5.2 Impact on other plants including adjacent crops (KCP 6.5.2)

During the conduct of efficacy and selectivity trials, no observations about negative effects on other plants or neighbouring crops were reported. Furthermore, it was demonstrated that Azadirachtin 1% EC is not phytotoxic to the crops claimed in the GAP.

According to EPPO PP 1/256, no data are normally required for insecticide such as Azadirachtin 1% EC. Furthermore, azadirachtin has been used for several years on e.g. tomato, potato and ornamental crops, without identifying any issues.

Comments of zRMS:	The Applicant did not submit the results of the trials on possible impact on adjacent crops. The information collected in previous section and a review of available literature as well as the lack of phytotoxicity symptoms recorded during the field trials suggests that product application in accordance with label recommendation has no negative impact on adjacent crops.

3.5.3 Effects on beneficial and other non-target organisms (KCP 6.5.3)

From the experimentation carried out with Azadirachtin 1% EC in 2016 and 2017, no problems regarding adverse effects on beneficial organisms were reported.

Special tests to investigate this purpose are not required.

For more information, see the results of the standard ecotoxicological tests being presented in dRR Part B section 6.

Compatibility with current management practices including IPM

This is not an EC data requirement/ not required by Directive 91/414/EEC.

Comments of zRMS:	Adverse effects on beneficial organisms (other than bees) are presented in section 6 Ecotoxicology.

3.5.4 Tank cleaning

Relevant information on tank cleaning is included in dRR Part B124. Please refer to this section for complete evaluation.

Comments of zRMS:	ZRMs agree. Relevant information on tank cleaning were included in dRR Part B124.

3.6 Other/special studies

No other studies were conducted

3.7 List of test facilities including the corresponding certificates

The following table gives information about the testing facilities where trials mentioned in this document were conducted. All facilities are certified and the trials were conducted according to GEP guidelines.

Table 3.7-1: List of test facilities

			Year and trial type			
			Efficacy trials		Selectivity trials	
Testing facility	**Zone**	**Country**	**2016**	**2017**	**2016**	**2017**
Tomato						
Novacert LTD	MED	GR	2	-	-	-
Anadiag France	MED	FR	1	-	1	-
Biofarm S.r.l.	MED	IT	3	-	1	-
Zkusebni stanice Nechanice	MAR	CZ	-	-	1	-
Fertico Sp. Z o.o.	N-E	PL	-	2	-	-
Anadiag	N.E	PL	1	-	2	-
Total, Tomato			**7**	**2**	**5**	**-**
Potato						
Novacert LTD	MED	GR	1	-	-	-
Biofarm S.r.l.	MED	IT	2	-	-	-
Hetterich FieldWork GbR	MAR	DE	-	1	-	-
Zkusebni stanice Nechanice	MAR	CZ	2	-	1	-
Agropass Hungária kft.	MAR	CZ	2	-	1	-
Fertico Sp. Z o.o.	N-E	PL	-	4	-	-
LAMMC	N-E	LT	1	-	1	-
Anadiag	N.E	PL	2	-	-	-
Total, Potato			**10**	**5**	**3**	**-**
Ornamental						
Hetterich FieldWork GbR	MAR	DE	1	1	-	3
Zkusebni Stanice Trutnov	MAR	CZ	1	-	1	-
Anadiag	N-E	PL	1	-	2	-
Total, Ornamental			**3**	**1**	**3**	**3**
Total, All crops			**20**	**8**	**11**	**3**

This table has been coded. For a complete view with the GEP certificates please refer to KCP 6.0-001 Biological Assessment Dossier Azadirachtin 1% EC.

Appendix 1 Lists of data considered in support of the evaluation

List of data submitted by the applicant and relied on

Data point	Author(s)	Year	**Title** **Company Report No.** **Source (where different from company)** **GLP or GEP status** **Published or not**	**Vertebrate study Y/N**	Owner
CP 6.0-001	Anonymous	2020	Biological Assessment Dossier: Azadirachtin 1% EC (10 g/kg azadirachtin) – EU Central zone Sharda Cropchem España -, - Unpublished	N	SHA