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Final Report

Evaluation of the physical compatibility of Sea2Soil as a tank mixture with various registered products.

Guidelines

Efficacy Guideline 604: Efficacy Data Required for Tank Mixtures and Sequences of Pesticides

Chapter 3, Part C of the Data Requirements Handbook, 'Guidelines for the generation of data on the physical, chemical and technical properties of plant protection products'.

Testing Facility

Eurofins Agroscience Services Ltd.

Slade Lane

Wilson, Melbourne

Derbyshire DE73 8AG

UK

Sponsor

Pelagia (Bressay) Limited

Heogan Road

Bressay

Shetland ZE2 9EW

UK

EAS Study Code S24-101770-03

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Statement of Compliance

This report details the result of a dynamic laboratory test of the physical compatibility of tank mixtures as devised by ASTM International, method E1518-05 (Reapproved 2019) Standard Practice for Evaluation of Physical Compatibility of Pesticides in Aqueous Tank Mixtures by the Dynamic Shaker Method.

The results have been interpreted in strict accordance with the published method, under the parameters of this practice, the results will define whether the pesticide mixture is or is not compatible in the laboratory, compatibility or incompatibility in the field should be confirmed under field conditions.

I confirm that the raw data generated in the study described is valid**,** and this report fully and accurately reflects the procedures followed.	I, the undersigned have reviewed this study report and confirm it is an accurate and faithful record of the results obtained.
Digitally signed by Elizabeth Osborne Date: 2025.02.24 14:36:26 Z Date/ Name (Principal Scientist)	Digitally signed by Ruth Fordham Date: 2025.02.24 14:41:21 Z Date / Name (Reviewer/Approver)

Eurofins Agroscience Services Ltd. cannot accept responsibility for subsequent decisions made or actions taken by the Sponsor on the basis of this Report.

1 Summary

The objective of the study was to evaluate the physical compatibility of Sea2Soil as a tank mixture with various registered products / adjuvants.

Physical compatibility tests were conducted using the dynamic laboratory test of the physical compatibility of tank mixtures as devised by ASTM International, method E1518-05 Standard Practice for Evaluation of Physical Compatibility of Pesticides in Aqueous Tank Mixtures by the Dynamic Shaker Method.

The results have been interpreted in strict accordance with the published method, under the parameters of this practice, the results will define whether the pesticide mixture is or is not compatible in the laboratory, compatibility or incompatibility in the field should be confirmed under field conditions.

The results are presented in full in Section 4.

2 Materials and Methods

2.1 Significance and Use

This practice is designed for researchers, applicators, and end users of pesticides where one or more ingredients are being mixed into an aqueous spray system. The practice is useful in determining physical compatibility of aqueous spray mixtures of pesticides and/or fertilizers.

The practice is not designed to determine physical compatibility of non-aqueous based spray mixtures.

The results or the testing should be used to determine the compatibility of the mixture ingredients in dynamic applications. Interpolation of static results to the expectations of the results of this test is not encouraged.

2.2 Scope

This practice describes the method for the evaluation of the physical compatibility and stability of pesticide tank mixtures diluted for aqueous application. This practice may also be adapted to use with liquid fertilizers in replacement of the water diluent.

Tank mix compatibility can be affected by many variables. Care should be taken to duplicate test conditions.

This practice addresses the standard variables such as time, temperature, water hardness, method of agitation, and degree of agitation.

Compatibility is complex and can be affected by other variables such as order of addition, pH of the dilution water, pumping shear, etc. Under the parameters of this practice, the results will define whether the pesticide mixture is or is not compatible in the laboratory. Compatibility or incompatibility should also be confirmed under field spray conditions.

Proper safety and hygiene precautions must be taken when working with pesticide formulations to prevent skin or eye contact, vapour inhalation, and environmental contamination.

Read and follow all handling instructions for the specific formulation and conduct the test in accordance with good laboratory practice.

The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2.3 Summary of Practice

In this practice, pesticides are diluted in water and tank mixed at specific application rates. Evaluations are conducted under dynamic conditions. Pesticides are mixed and kept under agitation by a mechanical shaker running at 385 oscillations per minute. Evaluations are conducted at chosen water hardnesses and temperatures. Compatibility is measured in terms of the dispersion stability and screen residue.

Pesticides being examined for mixing compatibility should be evaluated individually as controls.

Order of Addition-Pesticides should be tank mixed as recommended on the product label. If the order of the addition is not specified, then all possible orders of addition should be tested. The following is a general guide: (1) water soluble concentrates, (2) water dispersible granules (dry flowables), (3) wettable powders, (4) liquid flowables, and (5) emulsifiable concentrates.

This practice, E1518-05 (Reapproved 2019), is under the jurisdiction of ASTM Committee E35 on Pesticides, Antimicrobials and Alternative Control Agents and is the direct responsibility of subcommittee E35.22 on Pesticide Formulation and Delivery Systems.

2.4 Reagents

Purity of Reagents

Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society where such specifications are available.

Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

Purity of water - unless otherwise indicated, references to water shall be understood to mean reagent water as defined by type IV of Specification D 1193.

Synthetic hard water stock - to be made following the instructions given in the ASTM method.

This mixture is equivalent to ppm calcium carbonate ($CaCO_3$) and is based on a compositional ratio of 4:1 calcium carbonate to magnesium carbonate.

2.5 Test and Reference Item(s)

Product Name	Active ingredient(s)	Content of a.i nominal	Formulation Type
Sea2Soil	Nitrogen Minerals Trace elements Amino Acids	N/D	LI
Nirvana	imazamox pendimethalin	16.7 g/L 250 g/L	EC
Tower	chlorotoluron diflufenican pendimethalin	250 g/L 40 g/L 300 g/L	SC
Cadou Met	diflufenican flufenacet metribuzin	60 g/L 240 g/L 70 g/L	SC
Chronicle	pendimethalin picolinafen	320 g/L 16 g/L	SC
Proclus	aclonifen	600 g/L	SC
Tebucur 250	tebuconazole	250 g/L	EW
Arizona	folpet	500 g/L	SC
Lybro	pyclostrobin	200 g/L	EC
Laminone	laminarin	37 g/L	SL
Tacazana Era	benzovindiflupyr prothioconazole	75 g/L 150 g/L	EC
Diadem XE	fluxapyroxad mefentrifluconazole	47.5 g/L 100 g/L	EC
Vimoy	isoflucypram	50 g/L	EC

2.6 Procedure

Dynamic Shaker Method

1. 100ml water of desired hardness less the total amount of pesticide specified in points 2 and 4 was transferred into a 120ml (4oz) jar.

Note 1 - Temperature was maintained a 25 +/- 2^0C throughout the test.

2. A specified amount, according to the product label directions, of the first pesticide was added to the jar. Liquid pesticides were delivered with a pipette and solid pesticides were weighed in.

3. The jar was swirled to ensure that the first pesticide was well dispersed.

4. A specified amount, according to the product label directions, of each additional pesticide was added to the jar used in point 1. Delivered as in point 2. After each pesticide addition, the jar was capped and swirled sufficiently to disperse the mixture.

5. The jar was placed in the shaker. The jar was perpendicular and at an approximately 45^o angle to the horizontal shaft of the shaker.

6. The jar was shaken for 30 minutes at 385 oscillations per minute.

7. The jar was removed from the shaker and swirled; the contents was poured immediately through a 50-mesh (300 micron) sieve. An observation was made for residue remaining both on the sieve and in the jar, amount and type were recorded as described in Section 3.

8. The jar was rinsed with two 50ml portions of test water, each was poured through the 50-mesh sieve. An observation was made for residue as in point 7.

9. The contents was discarded in a safe manner.

3 Reporting of Results

The results of this practice are reported as **either compatible or incompatible;**

Compatible - The formulation of a well- dispersed mixture of pesticides in water. No non-rinsable residue found on the 50-mesh sieve or remaining on bottle walls should be considered compatible.

Incompatible - Separation of the mixture of pesticides in water where flocculation, coagulation, gel or curd found during or at the end of the test that will not re-disperse nor pass through the 50-mesh sieve should be considered incompatible. Any residue as described previously found remaining on the bottle should be considered incompatible.

4 Results of Test

This report details the result of a dynamic laboratory test of the physical compatibility of tank mixtures as devised by the ASTM International Method E1518-05 Standard Practice for Evaluation of Physical Compatibility of Pesticides in Aqueous Tank Mixtures by the Dynamic Shaker Method.

The results have been interpreted in strict accordance with the published method, resulting in a compatible or incompatible result.
The ultimate decision whether the difference in the mixture represents a significant change from the products tested alone rests with the Sponsor, and should be confirmed with field based tests.

Study Number :	S24-101770-03		**Tested By :**	E. Osborne	**Date:** 10 Dec 2024

Spray Volume :	200	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Nirvana	4.500 L/ha	2.250 mL	No residue
2	Sea2Soil	10.000 L/ha	5.000 mL	No residue
Mixture	As above	As above	As above	No residue
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	10 Dec 2024

Spray Volume :	150	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Tower	2.000 L/ha	1.333 mL	No residue
2	Sea2Soil	10.000 L/ha	6.667 mL	No residue
Mixture	As above	As above	As above	No residue
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	20 Feb 2025

Spray Volume :	100	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Cadou Met	1.000 L/ha	1.000 mL	No residue
2	Sea2Soil	10.000 L/ha	10.000 mL	Miniscule amount of residue on sieve, rinsed off
Mixture	As above	As above	As above	Similar amount of residue on sieve, rinsed off
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	23 Jan 2025

Spray Volume :	200	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Chronicle	3.000 L/ha	1.500 mL	1 flake left on sieve
2	Sea2Soil	10.000 L/ha	5.000 mL	No Residue
Mixture	As above	As above	As above	1 flake left on sieve
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	10 Dec 2024

Spray Volume :	200	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Proclus	1.400 L/ha	0.700 mL	No residue
2	Sea2Soil	10.000 L/ha	5.000 mL	No residue
Mixture	As above	As above	As above	Miniscule amount of residue on sieve, rinsed off
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	10 Dec 2024

Spray Volume :	100	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Tebucon	1.000 L/ha	1.000 mL	No residue
2	Sea2Soil	10.000 L/ha	10.000 mL	Miniscule amount of residue on sieve, rinsed off
Mixture	As above	As above	As above	Similar amount of residue on sieve, rinsed off
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	10 Dec 2024

Spray Volume :	200	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Arizona	1.500 L/ha	0.750 mL	No residue
2	Sea2Soil	10.000 L/ha	5.000 mL	No residue
Mixture	As above	As above	As above	No residue
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	11 Dec 2024

Spray Volume :	200	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Lybro	1.250 L/ha	0.625 mL	No residue
2	Sea2Soil	10.000 L/ha	5.000 mL	No residue
Mixture	As above	As above	As above	No residue
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	11 Dec 2024

Spray Volume :	50	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Laminone	1.000 L/ha	2.000 mL	No residue
2	Sea2Soil	10.000 L/ha	20.000 mL	Miniscule amount of residue on sieve, rinsed off
Mixture	As above	As above	As above	Similar amount of residue on sieve, rinsed off
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	11 Dec 2024

Spray Volume :	100	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Tacanza Era	1.000 L/ha	1.000 mL	No residue
2	Sea2Soil	10.000 L/ha	10.000 mL	Miniscule amount of residue on sieve, rinsed off
Mixture	As above	As above	As above	Similar amount of residue on sieve, rinsed off
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	23 Jan 2024

Spray Volume :	100	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Diadem XE	1.500 L/ha	1.500 mL	No residue
2	Sea2Soil	10.000 L/ha	10.000 mL	Miniscule amount of residue on sieve, rinsed off
Mixture	As above	As above	As above	Similar residue on sieve, rinsed off
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

Study Number :	S24-101770-03		Tested By :	E. Osborne	Date:	11 Dec 2024

Spray Volume :	150	L/ha

Mixing order	Product	Rate product/ha	Rate product/100mL	Results and comments after 30 minutes
1	Vimoy	1.500 L/ha	1.000 mL	No residue
2	Sea2Soil	10.000 L/ha	6.667 mL	No residue
Mixture	As above	As above	As above	No residue
Test result (PC/CA = Physically compatible with continuous agitation, I = Incompatible)				PC/CA

Key to symbols used in Results column above

PC/CA = Physically compatible with continuous agitation
I = Incompatible

5 Copy of the Certificate of Official Recognition of Efficacy Testing Facilities

Certificate of

Official Recognition of Efficacy Testing Facilities or Organisations in Great Britain

This certifies that

Eurofins Agroscience Services Limited

complies with the minimum standards laid down in Regulation (EC) 1107/2009[1] for efficacy testing.

The above Facility/Organisation has been officially recognised as being competent to carry out efficacy trials/tests in Great Britain in the following categories:

Agriculture/Horticulture
Biologicals and Semiochemicals
Stored Crops
Vertebrate Control

Date of issue: 28 March 2023
Effective date: 1 January 2023
Expiry date: 31 December 2027

Date: 2023.03.28 12:00:24 Z
HSE Digital Signature

HSE
Chemicals Regulation Division

Certification Number
ORETO 441

Department of Agriculture and Rural Development

[1] Regulation (EC) 1107/2009 as it has effect in Great Britain