TECHNICAL NOTES FOR SEQUOIA®

SUMMARY

- A rapid acting systemic and translaminar insecticide for the control of aphids and whitefly.
- Highly effective across a wide range of aphid and whitefly species.
- Active by contact and ingestion.
- New active Isoclast in a new chemical class the Sulfoximines, IRAC group 4C. Lack of cross resistance to all other chemical groups.
- Controls pyrethroid, carbamate, neonicotinoid and organophosphate resistant aphid types.
- Usable in Integrated Pest Management (IPM) and compatible with a wide range of beneficial insects and mites, see page 8.

Approved for use on crops grown under permanent protection with full enclosure – aubergine (including pepinos), tomato, courgette and summer squash, cucumber, gherkin, melon, watermelon, winter squash and pumpkin, ornamental plant production and pepper (including chilli pepper).
For aphid control the rate of application is 200 ml/ha which may be repeated after a specified interval of 14 days if needed. A maximum of 2 applications per year is allowed at this rate.
For whitefly control the rate of application is 400 ml/ha. This application may not be repeated within a year.
A water volume of 400 to 1200 litres/ha is recommended.
Applications may be made to edible crops from the first primary shoot visible stage until fruit ripening stage.
A 1 day harvest interval applies to edible crops and 8 days for ornamental plant production.
Tank mix information is summarised on page 7, beneficial insect compatibility on page 8.

Use plant protection products safely. Always read the label and product information before use.
Further product information, including warning phrases and symbols, is included in the main product manual.

VERSION CONTROL

Version	Publication Date	Change from previous version
04/19	April 2019	New product.

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These notes are designed to support the main product manual insert on SEQUOIA and advise on how to obtain the best possible pest control from the product.

INTRODUCTION

HISTORY AND DEVELOPMENT

Isoclast active (sulfoxaflor) discovered by Dow Agrosciences is the first member of a new class of insecticides the Sulfoximines. Developed globally for pest control in major crop groups such as cotton, citrus, soybeans, cereals, rice, grapes.

Isoclast is approved in a number of countries and was first approved in UK as SEQUOIA in October 2018. EC Inclusion date under EC 1107/2009 was in 2015.

In January 2019 Isoclast was registered in 81 countries.

SEQUOIA was released in the UK on MAPP 18677 in January 2019. In April 2019 a new joint UK / Irish label was published under MAPP 18938/PCS No 05915. There are differences between the labels in a number of areas.

PESTS CONTROLLED

SEQUOIA is labelled for the control of aphids and whitefly. A higher rate is recommended for whitefly control.
Growers may see some effect on other sucking pests such as: psyllids, scale insects, several species of thrips, planthoppers, leafhoppers, fleahoppers, stink bugs, capsids and mealybugs but these are not on the label and efficacy cannot be guaranteed.

SEQUOIA has a good IPM profile see below.

ATTRIBUTES:

- Active by contact and ingestion.
- Rapid cessation of feeding, knockdown and residual control reducing virus spread.
- Excellent translaminar activity (moves through the leaf), giving control of hidden pests in the plant canopy and on the underside of leaf.
- Excellent systemic activity being xylem mobile it moves upwards in the plant.
- Unique mode of action. Effective against populations resistant to other insecticides
- Valuable partner in rotation with other modes of action.
- Minimal impact on beneficial insects and predatory mites. Good fit in IPM programmes.
- Degrades rapidly in soil.
- Effective at low dose rates.

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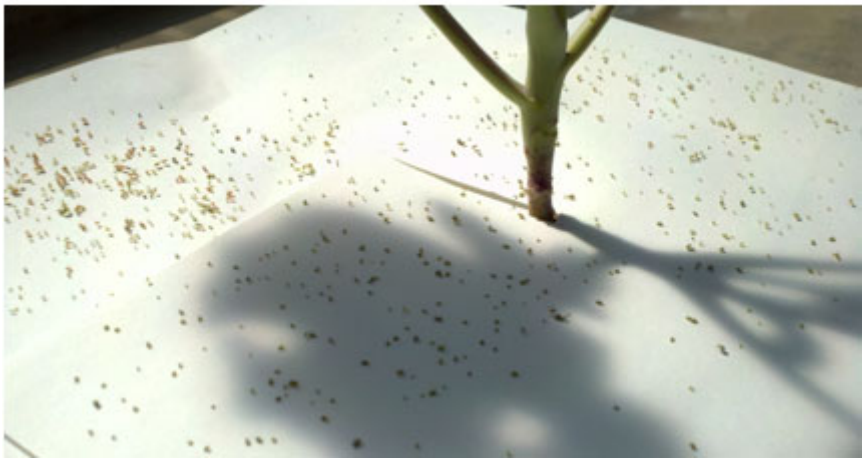
Figure 1: **SEQUOIA is fast acting.** Peach potato aphid. Fallen from plant. Elapsed time 30 minutes.	

INSECTICIDE RESISTANCE GROUP

Isoclast active (sulfoxaflor) has been classified by the Insecticides Resistance Action Committee (IRAC) as Group 4C the Sulfoximines, a new class of insecticides.
At the time of writing Isoclast is the only member of the group.

- Acts on the nervous system causing tremors paralysis and death.
- Lack of cross resistance to all other available insecticides and controls pyrethroid, carbamate, neonicotinoid and organophosphorus resistant aphid types.

PERSISTENCE IN PLANT

Although the product breaks down rapidly in the soil, it is reasonable to assume that activity will remain in the plant for 10 - 14 days after application.

APPROVED CROPS:

The label allows use in crops under permanent protection with full enclosure:

Aubergine (including pepinos), tomato.
Courgette and summer squash, cucumber, gherkin, melon, watermelon, winter squash and pumpkin.
Ornamental plant production.
Pepper (including chilli pepper).

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The CRD definition of permanent protection with full enclosure is:
Protected crop situations which provide full enclosure (including continuous top and side barriers down to below ground level) and which are present and maintained over a number of years.

CROP SAFETY

No damage has been reported on any edible crops on label.

The following ornamental crops are on label:
Chrysanthemum, *Calendula* spp (Marigolds), Aster, *Bellis perennis* (Daisy), Geranium, *Nicotiana*, *Euphorbia*, *Gerbera* and *Lantana*.

Table 1 lists additional plants which have been trialled. No damage was reported.

Table 1: Ornamental plant treated in trials.
Growth stage is by BBCH* see below for definition. No damage was reported.

Ornamental	Cultivar	Growth Stage treated*
Aechmea	Fia	Between 41 & 65
Aeschynanthus lobbiatus		Between 41 & 65
Azalea	Hellmut Vogel	Between 41 & 65
Begonia tuberhybrida		Between 41 & 65
Bellis perennis	Bellissima Red	61
Bellis perennis	Tasso	65
Calendula officinalis	Calypso	65
Chrysanthemum	Aloha	59
Chrysanthemum	Euro	55-60
Chrysanthemum	Malibu Bianco	59
Chrysanthemum	Olawa Red	65
Codiaeum	Aububifolia	Between 41 & 65
Codiaeum	Emma	Between 41 & 65
Codiaeum	Gold Moon	Between 41 & 65
Codiaeum	Pictum	Between 41 & 65
Codiaeum	Sunny Star	Between 41 & 65
Cordyline	Redstar	Between 41 & 65
Dischidia ruscifolia		Between 41 & 65
Dracaena		Between 41 & 65
Euphorbia pulcherrima	Primero Red	19
Ficus benjamina	Golden King	Between 41 & 65
Ficus pumila		Between 41 & 65
Gerbera	Spider	65-67
Hedera	Montgomery	Between 41 & 65
Lantana camara	Radiation	62
Muehlenbeckia		Between 41 & 65
Nicotiana rustica	Havana	61

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Pelargonium (Geranium)	Decora Imperial	65
Peperomia rotundifolia		Between 41 & 65
Philodendron scandens		Between 41 & 65
Polyscias balforiana		Between 41 & 65
Spathiphyllum	Alfa	Between 41 & 65
Syngonium	White Butterfly	Between 41 & 65
Tillandsia cyanea		Between 41 & 65
Viola tricolor		Between 41 & 65
Vriesea	Vogue	Between 41 & 65

Table 2: BBCH* Growth Stage Guide:

BBCH growth scale is a system of uniformly coding similar stages of growth of plants.
Green - mentioned on label

BBCH Growth stage	Brief description – although this will depend on the plant species involved.
12	2 true leaves, leaf pairs unfolded.
19	9 or more true leaves. Leaf pairs unfolded.
20	1st primary shoot visible.
21	1st side shoot visible.
40	Harvestable vegetative plant parts or vegetatively propagated organs begin to develop.
59	First flower petals visible (in petalled forms).
61	Beginning of flowering: 10% of flowers open.
62	20% of flowers open.
65	Full flowering. 50% of flowers open. First petals may have fallen.
67	Flowering finishing. Majority of petals fallen or dry.
87	Fruit ripening.

Growers are advised to test the product on a small number of plants before treating the whole crop.

APPLICATION MIXING AND SPRAYING

APPLICATION RATE

For aphid control a rate of 200 ml/ha is specified. For whitefly an application rate of 400 ml/ha is specified. For resistance management reasons do not apply less than the recommended rate.

MAXIMUM NUMBER OF APPLICATIONS & INTERVAL BETWEEN SPRAYS

Where two sprays are allowed (200 ml per ha) they should be applied at least 14 days apart. When applied at 400 ml per ha then only one spray is allowed.

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USE WITH ADJUVANTS

Trials have shown no benefits from their use.

HARVEST INTERVAL

There is a 1 day harvest interval for edible plants.
Ornamental plants may not be handled or harvested for 8 days after application.

WATER VOLUMES FOR APPLICATION

The water volume used should reflect the need for uniform cover and penetration of the leaf canopy. The water volume on the label is from 400 to 1200 litres per ha.

COMPATIBILITIES

TANK MIXING

There are no recommendations for tank mixing. Table 3 below lists available information on physical compatibility. Any tank mixes are at grower risk.

Table 3: Tank mixing (**see notes and restrictions at the end of this table**)

Product	Key	Product	Key
Fungicides:			
Amistar	P	Signum	P
Cercobin WG	P	SL 567A	P
Microthiol Special	P	Switch	P
Proplant	P		
Insecticides:			
Conserve	P	Plenum WG / Tafari / Chess WG	P
Coragen	P	Runner	P
Decis Protech	P	Steward	P
Dynamec	P	Sumi-Alpha	P
Envidor	P	Teppeki / Mainman	NC
Hallmark Zeon	P	Tracer	P
Combination mixes:			
Steward + Signum	P		
Adjuvants:			
Actirob B	P	Kinetic	P
Cropspray	NC	Silwet L-77	P

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Fertilisers and Trace Elements:			
Bittersaltz	P	Mantrac DF 3kg/ha	P
Bortrac 150 3l/ha	P	Mantrac Pro 1l/ha	P
Brassitrel Pro 3l/ha	P	Micothial Special	P
Bud Builder FL 10l/ha	P	Molytrac 0.25l/ha	P
Coptrel 0.5l/ha	P	Photrel Pro 3kg/ha	P
Croplift 5kg/ha	P	Safe N300 10l/ha	P
Epsotop	P	Seniphos 10l/ha	P
Ferleaf 1l/ha	P	Stopit 10l/ha	P
Foliar Potash 10l/ha	P	Thiotrac 300 10l/ha	P
Gramitrel 4l/ha	P	Wettable Sulphur	P
Magflo 300 4l/ha	P	Yaravita Magflo 300	P
Magnor	P	Yaravita Photrel Pro	P
Magphos K 10l/ha	P	Zintrac 700 1l/ha	P
Mancozin 2l/ha	P	Zynergy	P
Mancuflo 2l/ha	P		
Herbicides:			
Kerb Flo 500	P	Laser	P

Key:

P = Physically compatible. NC = not compatible.

This information is prepared as guidance of physical compatibility only. No tests have been carried out on crop safety for tank mixtures.

Some of the products listed may not be approved for the crops included on the approval. Some products listed may not be available in the UK or Ireland.

Physical compatibility data is based on the results of an industry recognised standard test. Be aware that in the field, water hardness, pH, temperature etc. can vary. Physical compatibility does not include biological compatibility which has not been tested.

Do not use any tank-mix if the mixture cannot be applied within the recommendations for individual products or if specific tank mix restrictions apply.

This additional information is for guidance purposes only and use is at grower's risk. No liability can be accepted for any compatibilities beyond the label. For any new mixture do tests on a small sample of crop before wider use.

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COMPATIBILITY WITH BENEFICIAL INSECTS AND MITES

Work on compatibility with beneficial insects and mites is still underway but the following table gives a guide to current knowledge at the time of writing.

Table 4: compatibility with beneficial insect and mites

Beneficial	Comments
Aphidoletes aphidimyza	Larvae: minimum impact. Adults: no information.
Amblyseius (*Neoseiulus*) *cucumeris*	Harmless.
Amblyseius swirskii	Harmless.
Aphidius colemani	Larvae: minimum impact. Adults: harmful.
Chrysoperla carnea	Harmless.
Encarsia formosa	Larvae / black scales: harmless. Adults: harmful.
Macrolophus pygmaeus	Low sensitivity but care suggested.
Orius laevigatus	Some sensitivity so care suggested.
Phytoseiulus persimilis	Harmless.
Typhlodromus pyri	Harmless.

Bees:
Bee hives should be covered or removed at the time of application and re-introduced at an appropriate time after the spray deposits have dried. Under commercial conditions this is usually after a period of 24 hours after the application.

HOW IS SEQUOIA PACKAGED?

250 ml bottles in outers of 24.

APPROVAL HOLDER

Dow Agrosciences Limited
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Fulbourn,
Cambridge
CB21 5XE
Marketed in the UK by Fargro Ltd.
Safety data sheet available on request.

Pack Size: 250 ml (outer 24).