



# SERENADE<sup>®</sup> ASO

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## Fungicide

**Serenade ASO is a foliar fungicide for the reduction of damage caused by various fungal diseases in a wide range of agricultural and horticultural crops.**

A suspension concentrate containing 1015.1 g/L *Bacillus subtilis* strain QST 713 (including fermentation residues and water). Containing a minimum of  $1.05 \times 10^{12}$  cfu/L.

For professional use only.

Contains micro-organisms, may produce an allergic reaction.

### Authorisation holder:

Bayer CropScience Ltd.  
230 Cambridge Science Park  
Milton Road, Cambridge CB4 0WB  
United Kingdom

### Marketing company:

Bayer CropScience Ltd.  
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Sandyford, Dublin 18  
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### For 24 hour emergency information contact

**Bayer CropScience Ltd** Telephone: 00800 1020 3333

### Safety Information

#### **SERENADE ASO**

Containing 1015.1 g/L *Bacillus subtilis* strain QST 713 (a minimum of  $1.05 \times 10^{12}$  cfu/L).

Dispose of contents/container to a licensed hazardous waste disposal contractor or collection site except for triple rinsed empty containers which can be disposed of as non-hazardous waste.

**To avoid risks to human health and the environment, comply with the instructions for use.**

**PCS No. 03847**

PROTECT FROM FROST. Do not store below 4°C.



## **SAFETY PRECAUTIONS**

### **Operator Protection**

Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment:

WEAR SUITABLE PROTECTIVE CLOTHING (COVERALLS), SUITABLE PROTECTIVE GLOVES AND SUITABLE RESPIRATORY PROTECTIVE EQUIPMENT\* when handling the concentrate or applying the product.

\*Disposable filtering facepiece respirator to at least EN149 FFP3 or equivalent.

### **Environmental Protection**

Do not contaminate water with the product or its container (Do not clean application equipment near surface water/Avoid contamination via drains from farmyards and roads.)

Use appropriate containment to avoid environmental contamination.

This material and its container must be disposed of in a safe way.

### **Storage and Disposal**

RINSE CONTAINER THOROUGHLY by using an integrated pressure rinsing device or manually rinsing three times. Add washings to sprayer at time of filling and dispose of safely.

WASH OUT CONTAINER THOROUGHLY and dispose of safely.

## **COMPANY ADVISORY INFORMATION**

Serenade® ASO is a naturally occurring biological control agent suitable for use in organic growing systems. It is approved for use in organic farming under EC Regulation No.834/2007 & 889/2008 by IMO Switzerland.

However, it is advisable to check with your organic certification scheme before use.

**READ ALL INSTRUCTIONS CAREFULLY BEFORE USE.**



To access the **Safety Data Sheet** for this product scan the code or use the link below:

[www.bayercropscience.ie/sds/serenadeaso.pdf](http://www.bayercropscience.ie/sds/serenadeaso.pdf)

or alternatively contact your supplier

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IMPORTANT: This information is approved as part of the product label. All instructions within this section must be read carefully in order to obtain safe and successful use of this product.

## DIRECTIONS FOR USE

**For professional use only via tractor mounted/trailed sprayer and knapsack.**

**For professional use only as a horticultural fungicide.**

Serenade® ASO is a biofungicide containing *Bacillus subtilis* QST 713, naturally occurring bacteria that are not genetically modified.

Serenade ASO prevents plant diseases by first creating a zone of inhibition on the leaf and preventing attachment and penetration of the pathogens. Biological compounds produced by *Bacillus subtilis* QST 713 act to destroy germ tubes and mycelia of pathogenic fungi by puncturing their cell membranes. By preventing spore germination and penetration into the plant, the infection is stopped and disease is prevented from spreading to the rest of the plant. Furthermore, compounds produced by *Bacillus subtilis* QST 713 induce the systemic resistance response of the plant, indicated by enhanced peroxidase activity.

Serenade ASO may be applied as a foliar spray alone or in alternating spray programmes with other registered crop protection products. Alternating with fungicides of different modes of action, along with the use of cultural control methods, is advisable for resistance management.

### Restrictions and Warnings

CONSULT PROCESSOR BEFORE USING ON CROPS FOR PROCESSING

Do not apply using irrigation equipment.

Micro-organisms may have the potential to provoke sensitising reactions.

### RATES OF USE:

Crops	Maximum individual dose	Maximum number of applications	Maximum total dose	Latest time of application
<b>Foliar application:</b>				
Strawberry (protected and field)	8.0 L/Ha	6	48 L/ha	Up to second harvest (GS 89). PHI 1 day.
Lettuce (protected and field)	8.0 L/Ha	6	48 L/ha	Up to main shoot inside head beginning to elongate (GS 49). PHI 1 day.
Tomato, pepper and Aubergine (protected) <sup>1</sup>	8.0 L/Ha	6	48 L/ha	Up to fully ripe fruits (GS 89). PHI 1 day.
Grape	4.0 L/ha	4	16 L/ha	Up to berries ripe for harvest (GS 89). PHI 3 days.
Apple and pear	8.0 L/ha	6	48 L/ha	Up to fruit 90% final size (GS 79). PHI 3 days.
Oilseed rape	2.0 L/ha	2	4 L/ha	Up to end of flowering (GS 69). PHI 3 days.

Crops	Maximum individual dose	Maximum number of applications	Maximum total dose	Latest time of application
Carrot	8.0 L/ha	4	32 L/ha	Up to main shoot beginning to elongate (GS 49).
Ornamentals and roses (Field and Protected).	5 L/ha	6	30 L/ha	Up to plant resting or dormant (GS 85).
<b>Soil application:</b>				
Lettuce (field) <sup>2</sup>	5.0 L/ha	1	5 L/ha	Soil application in furrow. Up to third true leaf unfolded (GS 13).
Potato – main crop (field)	5.0 L/ha	1	5 L/ha	Soil in furrow application. Up to beginning of root formation (GS 5).
Carrot (field)	10 L/ha	1	10 L/ha	Soil application, broadcast spray with incorporation ideally to 10 cm depth, with a maximum of 20 cm depth (GS 0).

<sup>1</sup> For the treatment of *Botrytis cinerea* and *Sclerotinia* spp. on lettuce (field and protected) and *Pseudomonas syringae*, *Xanthomonas campestris* on tomato, aubergine and pepper use a maximum of 6 applications of Serenade per crop in a two crop cycle.

<sup>2</sup> For the treatment of *Rhizoctonia solani* on lettuce use only one application of Serenade per crop in a four crop cycle.

## Diseases Targeted

The level of disease control to be expected for all crops is reduction of damage.

Crops:	Diseases – Reduction of damage from:
<b>Foliar Application:</b>	
Strawberry (field and protected )	Grey mould ( <i>Botrytis cinerea</i> )
Lettuce (protected and field)	Grey mould ( <i>Botrytis cinerea</i> ), <i>Sclerotinia</i> ( <i>Sclerotinia</i> spp.)
Tomato, pepper and Aubergine (protected)	Grey mould ( <i>Botrytis cinerea</i> ), Bacterial spots ( <i>Pseudomonas syringae</i> , <i>Xanthomonas campestris</i> )
Grape (Field)	Grey mould ( <i>Botrytis cinerea</i> )
Apple and pear (Field)	Fire blight ( <i>Erwinia amylovora</i> )
Oilseed rape (Field)	<i>Sclerotinia</i> ( <i>Sclerotinia</i> spp.)
Carrot (Field)	Leaf blight ( <i>Alternaria dauci</i> ), Powdery mildew ( <i>Erysiphe heraclei</i> )
Ornamentals and Roses (Field and protected)	Powdery mildews

Crops:	Diseases – Reduction of damage from:
<b>Soil application:</b>	
Potato – main crop (Field)	<i>Helminthosporium solani</i>
Carrot (Field)	Cavity spot ( <i>Pythium violae</i> )
Lettuce (Field)	<i>Rhizoctonia solani</i>

## Crop Specific Information

### Foliar Application:

#### **Strawberry (protected and field crops).**

Apply in a water volume of 200 – 1000 Litres of water per hectare according to crop density. Apply as a MEDIUM quality spray (BCPC).

*Botrytis* control usually requires a programme of fungicide sprays and Serenade may be used as part of such a programme. Serenade ASO works preventatively and with a contact mode of action, so for successful control of *Botrytis* it is vital to achieve complete cover on all flowers and fruitlets throughout the blossom period. Sprayers should be set up in such a way as to achieve maximum cover on these parts, with sprays directed over the crop rows (not applied overall). The first spray of a botrytis fungicide programme should be made from first flower set (BBCH55). Apply Serenade ASO at a rate of 8 L/ha. Serenade ASO may be used up to a maximum of six applications. A minimum of five days should fall between applications of Serenade ASO.

#### **Lettuce (protected and field crops).**

Apply in a water volume of 200 – 1000 Litres of water per hectare according to crop density. Apply as a MEDIUM quality spray (BCPC).

*Botrytis* and *Sclerotinia* control usually requires a programme of fungicide sprays and Serenade may be used as part of such a programme. Apply Serenade ASO at a rate of 8 L/ha, from 3 true leaves, (BBCH 13), from the early onset of disease. Serenade ASO works preventatively and with a contact mode of action, so for optimum control it is vital to achieve complete cover when spraying. Serenade ASO may be used up to a maximum of six applications. A minimum of five days should fall between applications of Serenade ASO. All varieties of field and protected lettuce may be treated.

#### **Tomato, pepper and aubergine (protected crops).**

Apply in a water volume of 200 – 1500 Litres of water per hectare according to crop density. Apply as a MEDIUM quality spray (BCPC).

*Botrytis* control usually requires a programme of fungicide sprays and Serenade may be used as part of such a programme. Apply Serenade ASO at a rate of 8 L/ha, after the 3rd leaf on the main shoot has unfolded, (BBCH 13), from the early onset of disease. Serenade ASO works preventatively and with a contact mode of action, so for optimum control it is vital to achieve complete cover when spraying. Serenade ASO may be used up to a maximum of six applications. A minimum of five days should fall between applications of Serenade ASO.

#### **Grapes (field crops).**

Apply in a water volume of 100 – 1500 Litres of water per hectare according to crop density. Apply as a MEDIUM quality spray (BCPC).

*Botrytis* control usually requires a programme of fungicide sprays and Serenade may be used as part of such a programme. Apply Serenade ASO at a rate of 4 L/ha, from beginning of flowering (BBCH 60), Serenade ASO works preventatively and with a contact mode of action, so for optimum control it is vital to achieve complete cover when spraying. Serenade ASO may be used up to a maximum of four applications. A minimum of five days should fall between applications of Serenade ASO. All varieties of grapes may be treated.

### **Apples and pears (field crops).**

Apply in a water volume of 300 – 1000 Litres of water per hectare according to crop density. Apply as a MEDIUM quality spray (BCPC).

Fire blight risk is greatest when temperatures exceed 18°C and there is rain. Apply Serenade ASO at a rate of 8 L/ha, from beginning of flowering (BBCH 60), targeting the primary blossom infection period for best results, though it may be used until fruit are 90% of their final size (BBCH 79) Serenade ASO works preventatively and with a contact mode of action, so for optimum control it is vital to achieve complete cover when spraying. Serenade ASO may be used up to a maximum of six applications.

A minimum of three days should fall between applications of Serenade ASO. All varieties of apples and pears may be treated.

### **Oilseed rape (field crops).**

Apply in a water volume of 100 – 400 Litres of water per hectare according to crop density. Apply as a MEDIUM quality spray (BCPC). Apply Serenade ASO at a rate of 2 L/ha, during flowering (from BBCH 60 until BBCH 69). Serenade ASO works preventatively and with a contact mode of action, so for optimum control it is vital to achieve complete cover when spraying. Serenade ASO may be used up to a maximum of two applications. A minimum of five days should fall between applications of Serenade ASO. All varieties of oilseed rape may be treated.

### **Carrot (field crops).**

Apply in a water volume of 200 – 500 Litres of water per hectare according to crop density. Apply as a MEDIUM quality spray (BCPC).

Alternaria and powdery mildew control usually requires a programme of fungicide sprays and Serenade may be used as part of such a programme. Apply Serenade ASO at a rate of 8 L/ha, from 5 true leaves (BBCH 15) until expansion of the root is complete (BBCH 49). Serenade ASO works preventatively and with a contact mode of action, so for optimum control it is vital to achieve complete cover when spraying. Serenade ASO may be used up to a maximum of four applications. A minimum of five days should fall between applications of Serenade ASO. All varieties of carrot may be treated.

### **Ornamentals and roses (field and outdoor).**

For the control of powdery mildew on annual herbaceous ornamental (bedding) plants and roses. Apply as a MEDIUM quality spray (BCPC). Apply Bayer ornamental disease at a maximum rate of 5.0 L/ha, at early to end of flowering, (BBCH 19 – 89), in a water volume of 500 – 1000 Litres of water per hectare. Bayer ornamental disease may be used up to a maximum of six applications. A minimum of five days should fall between applications.

Bayer ornamental disease works preventatively and with a contact mode of action, so for optimum control it is vital to achieve complete cover when spraying.

The following species of ornamentals have been tested successfully in trials: *Saintpaulia*, *Kalanchoe*, *Rosa*, *Hedera*, *Gloxinia*, *Cyclamen*, *Gerbera*, *Chrysanthemum*. Due to variations in growing conditions and the range of varieties for each species, it is advisable to test for crop tolerance on a small sample of plants before treating the whole crop.

### **Soil application:**

#### **Lettuce (field crops).**

Apply in a water volume of 200 – 500 Litres of water per hectare Apply as a MEDIUM/COARSE quality spray (BCPC).

*Rhizoctonia* control usually requires a programme of fungicide sprays and Serenade may be used as part of such a programme. A single application of Serenade ASO at a rate of 5 L/ha may be made as a soil application, until the 3 true leave stage (BBCH 13). Serenade ASO works preventatively and with a contact mode of action, so for optimum control it is vital to achieve complete cover when spraying. All varieties of field lettuce may be treated.

#### **Potato – main crop (field crops).**

Apply in a water volume of 100 – 200 Litres of water per hectare.

*Helminthosporium solani* control usually requires a number of considerations including fungicides and Serenade may be used as part of such a programme primarily to reduce yield damage. A single application of Serenade ASO at a rate of 5 L/ha may be made as an in-furrow application at the time of planting. Serenade ASO works preventatively and with a contact mode of action including colonisation on the tuber, so for optimum control it is recommended to achieve contact with the tuber when spraying. All varieties of potato may be treated.

#### **Carrot (field crops).**

Apply in a water volume of 200 – 500 Litres of water per hectare. Apply as a MEDIUM/COARSE quality spray (BCPC). Cavity spot control usually requires a number of considerations including fungicides and Serenade may be used as part of such a programme. A single application of Serenade ASO at a rate of 10 L/ha may be made as a broadcast spray application before drilling followed by incorporation ideally to 10 cm depth, with a maximum of 20 cm depth. All varieties of carrot may be treated.

### **Mixing and Spraying**

Before use ensure that all spray equipment is clean.

Add half the volume of water required, and start agitating.

Agitate product container well and add the required amount of Serenade ASO, continue filling spray tank with the required volume of water.

Keep agitating until spraying completed.

All application equipment must be thoroughly cleaned with water prior to storage or use on another crop.

If a knapsack application is used, a dilution rate of 1 L Serenade ASO to 25 L water should be used, (which will be sufficient coverage of apx. 1/10th Ha.)

### **Storage**

Serenade ASO is a biological product and so should be treated with some care. It can be stored at room temperature for two years, storage at higher temperatures may reduce its shelf-life.



## SAFETY PRECAUTIONS

### Operator Protection

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\*Disposable filtering facepiece respirator to at least EN149 FFP3 or equivalent.

### Environmental Protection

Do not contaminate water with the product or its container (Do not clean application equipment near surface water/Avoid contamination via drains from farmyards and roads.)

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