BASF
We create chemistry

Serifel®

Balanced protection in your hands

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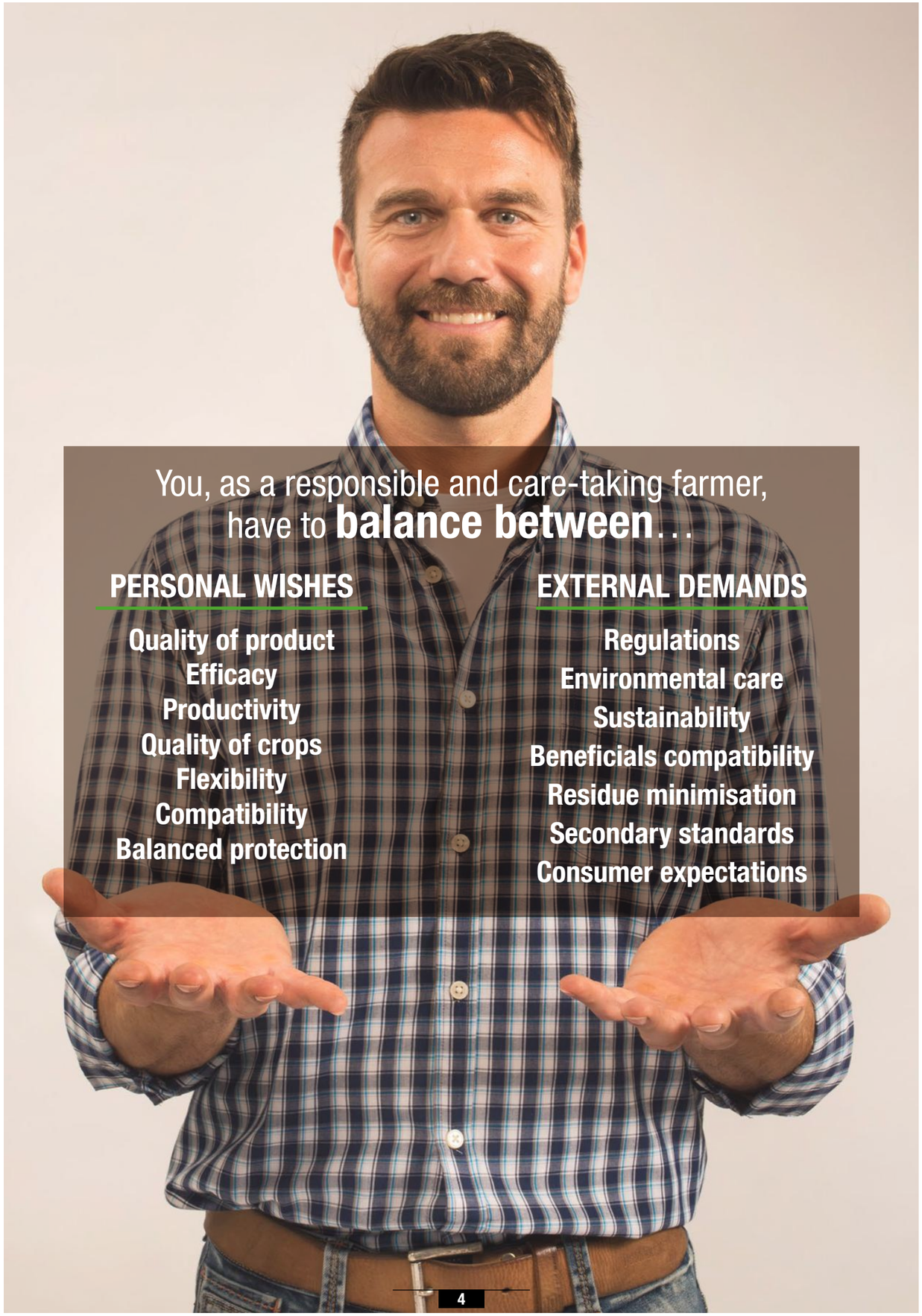


BALANCED PROTECTION

- As a farmer, you need innovative solutions to meet the challenges of modern crop protection: from **consumer food safety demands** to ever **evolving pests and diseases**.
- **Biological crop protection products**, also known as “biologicals”, “biological pesticides” or “biopesticides“, are based on living organisms that help to protect crops against damaging pests and diseases.
- Biological crop protection products complement chemical treatments as a vital part of a comprehensive **Integrated Pest Management (IPM) program**.
- Because they are often exempt from **Maximum Residue Level (MRL)** classification, biological pesticides help growers manage the demands of food retailers and consumers to further optimize residue levels on crops.
- Offered as part of the overall BASF fungicide portfolio, the **biological fungicide Serifel®** is an effective tool that helps growers control disease and meet sustainability challenges.

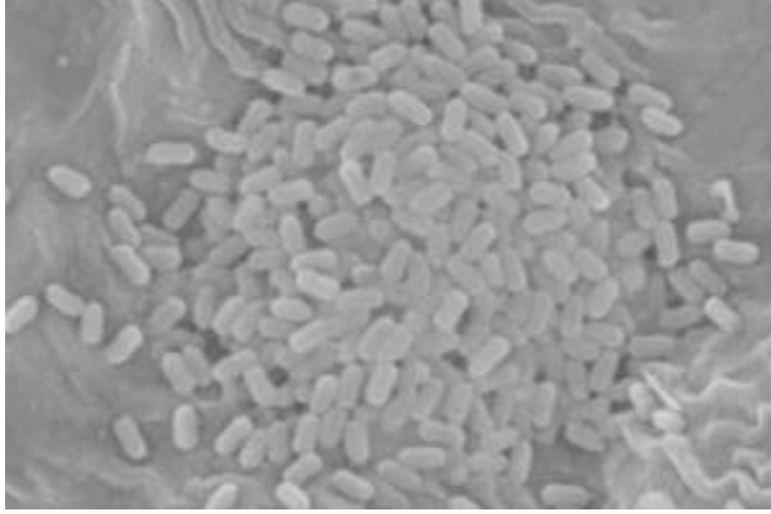
Serifel®
is an effective tool that helps growers control disease and meet sustainability challenges.

Serifel®

The way to achieve the balance

FEATURES AND BENEFITS

- BASF has developed **Serifel®**, a biological fungicide containing the active ingredient *Bacillus amyloliquefaciens* strain MBI600.
- Serifel® is the **most highly concentrated biological fungicide** on the market.
- Correctly used and applied, Serifel® offers a **sustainable solution for users, workers, consumers and the environment**.
- Serifel® can be used on a **wide range of crops** such as grapes, tomatoes, lettuces, strawberries and mushrooms.



Serifel®
PRODUCT PROFILE

ACTIVE INGREDIENT	>	*Bacillus amyloliquefaciens* strain MBI600
MODE OF ACTION	>	Multiple MoA
FORMULATION	>	WP formulation, 110 g/kg, min 5.5 x 10^10 cfu/g
CROPS	>	Grapes, tomatoes, strawberries, peppers, aubergines, lettuces and similar, small berries, mushrooms
TARGET (ORGANISMS)	>	*Botrytis cinerea* (all crops, except mushrooms) *Sclerotinia sclerotorium* (lettuce and similar) *Trichoderma aggressivum* (mushrooms)
APPLICATION RATE	>	All crops, except mushrooms: 0.5 kg/ha with 100-2000 l/ha water volume (depending on crop) Mushrooms: 2.5 g per 100 kg substrate
NUMBER OF APPLICATION	>	Grapes - up to 10 applications per year Vegetables - up to 6 applications per year Mushrooms – 1 application
SPRAY INTERVAL	>	5 to 7 days (depending on crop)
PHI	>	0 day

MODE OF ACTION

Serifel®'s active ingredient is *Bacillus amyloliquefaciens* strain MBI600. It is a beneficial spore-forming, rod-shaped bacterium, the spores of which are able to germinate, reproduce and colonize plant surfaces.

Serifel® works best as a preventative treatment before disease pathogens have established on the plant. Preventive application before disease infection gives **Serifel®** time to germinate, colonize the plant surface and produce disease-fighting metabolites. **Serifel®** forms a "shield of protection" against a broad spectrum of plant pathogens thanks to three following modes of action.

1. PRODUCTION OF METABOLITES

Serifel® produces specific metabolites that prevent a wide range of pathogens from germinating. The metabolites cause the pathogen spores and growing hyphae to collapse, by disrupting their cell membrane.

2. COMPETITION FOR SPACE

Moreover, by being the first to occupy the limited space on the plant, **Serifel®** physically excludes plant pathogens from occupying the same space.

3. COMPETITION FOR RESOURCES

Serifel® also depletes the supply of nutrients on the plant surface so that pathogen spores are not viable.

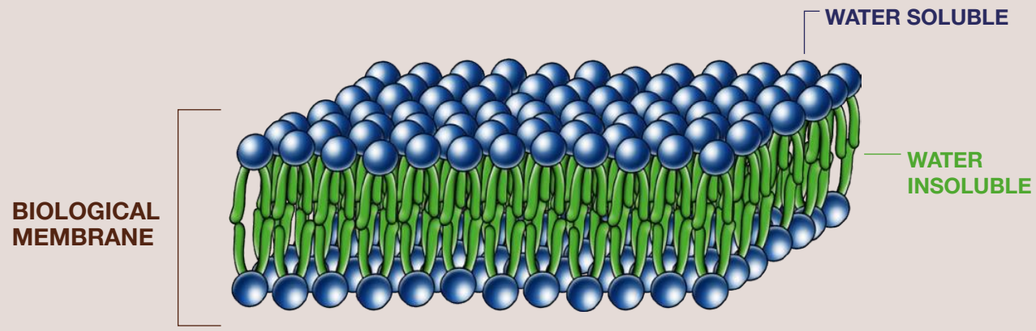
Inoculated only with *Botrytis cinerea*

Treated with Serifel before *Botrytis cinerea* inoculation

The mode of action of *Bacillus amyloliquefaciens* strain MBI600 is classified by the Fungicides Resistance Action Committee (FRAC) as FRAC 44 "microbial disrupters of pathogen cell membranes".

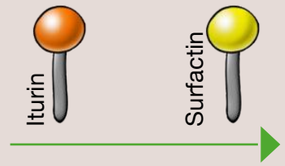
BUILDING BLOCKS OF BIOLOGICAL MEMBRANE

Biological membranes are complex structures of a lipid bilayer. The lipid building blocks of a biological membrane look like jellyfish, with many arms underneath and a smooth, roundish head protecting the parts below it. A biological membrane consists of two layers of lipid molecules. The heads form a stable, solid skin on the outside. Inside, the arms form a dense and very stable net which is nevertheless flexible.

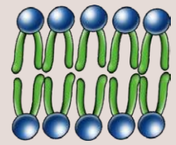


LIPOPEPTIDES

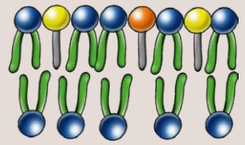
Serifel® is a pure spore formulation which does not contain metabolites.
Metabolites are produced by the bacteria that grow on the plant surface after application.
The most important groups of metabolites are iturins and surfactins.
Being similar to membrane building blocks, these lipopetide metabolites are able to insert deeply into membranes. Their conical shapes disrupts the normal structure of fungal.
The altered membrane structure is less stable due to buckling and pore formation.
Consequently membranes begin to leak and normal cell functionality is disrupted.



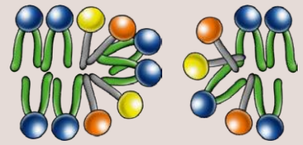
MEMBRANE BUILDING BLOCKS



1. Healthy pathogen membrane



2. Metabolites insert into pathogen membrane



3. Structure of pathogen membrane disrupted by the formation of pores

GRAPES

Serifel® protects grapes from common diseases such as grey mould (Botrytis cinerea). This ubiquitous pathogen attacks a wide range of host plants. Infection can occur very close to harvest, causing significant losses in yield and quality.

Frequent preventative applications of **Serifel®** halt the establishment of the pathogen on foliage and berry clusters. **Serifel®** offers an effective and flexible addition to any spray programme, where it may be used alone or in sequence or in tank-mixture with chemical fungicides.

Serifel® positioning against *Botrytis cinerea* in grapes

NO SPRAY DEPOSITS AFTER SERIFEL® APPLICATIONS

Biological standard

Spray deposits

Serifel®

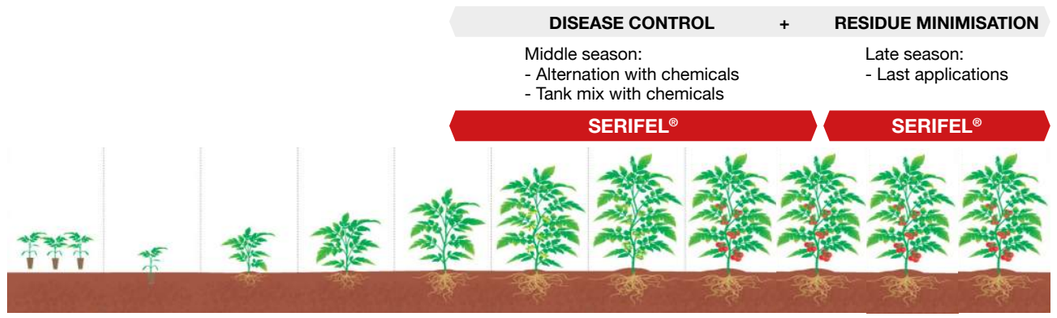
No deposits

TOMATOES

Serifel® can protect tomatoes and other fruiting vegetables from major fungal diseases such as grey mould (Botrytis cinerea).

Frequent preventative applications of **Serifel®** halt the establishment of the pathogen on foliage and fruit. **Serifel®** complements the other products in any spray program by providing greater flexibility until shortly before harvest.

Serifel® positioning against *Botrytis cinerea* in tomato



NO SPRAY DEPOSITS AFTER SERIFEL® APPLICATIONS

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Spray deposits

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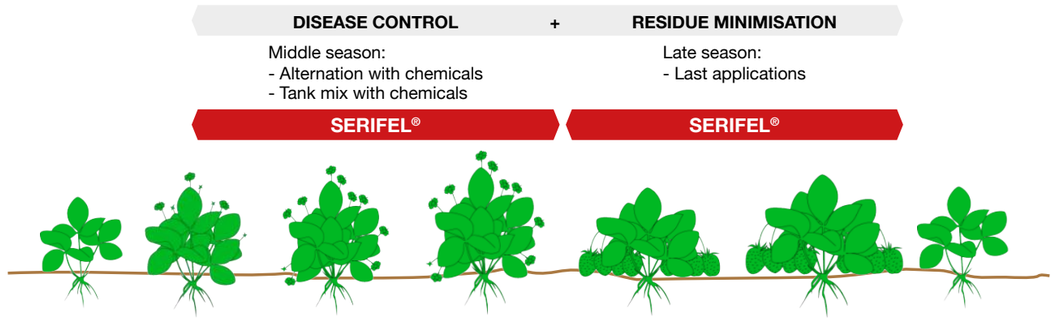
No deposits

STRAWBERRIES

Grey mould (*Botrytis cinerea*) is one of the most common and serious diseases and it is found wherever strawberries are grown. Serious infections can occur close to harvest. Under wet conditions, 80 – 90% of flowers and fruit may be destroyed in unsprayed crops.

Serifel® enables the production of top-quality strawberries with the lowest possible residues. Also, it forms a valuable biological tool to help combat the development of resistance.

Serifel® positioning against *Botrytis cinerea* in strawberry



NO SPRAY DEPOSITS AFTER SERIFEL® APPLICATIONS

Biological standard

Spray deposits

Serifel®

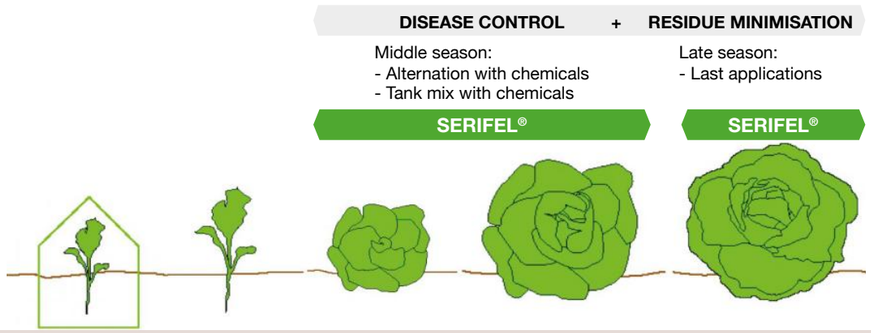
No deposits

LETTUCES

Two pathogens - grey mould (*Botrytis cinerea*) and white mould (*Sclerotinia sp.*) - are highly damaging diseases on lettuce. Lettuce plants affected by these diseases are often unmarketable or require additional cleaning.

Preventative applications of **Serifel®** in alternation and sequential spray programs with conventional fungicides before and close to harvest allows production of healthy lettuce with the lowest possible residues.

Serifel® positioning against *Botrytis cinerea* and *Sclerotinia sp.* in lettuce



NO SPRAY DEPOSITS AFTER SERIFEL® APPLICATIONS

Biological standard

Spray deposits

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FOOD VALUE CHAIN & MARKET REQUIREMENTS

- Secondary standards enforced by major European supermarkets dictate a high level of residue awareness and management.
- **Serifel®** offers farmers a tool to help minimize residue levels and/or reduce the overall number of actives found in marketed food commodities.
- Residue management objectives can be achieved using **Serifel®** whilst maintaining high standards of disease control without compromising crop yield or quality.

MEETING FARMER WISHES

- **Serifel®** is the most concentrated biological fungicide on the market due to its pure spore formulation.
- Environmental compatibility allows **Serifel®** to easily be integrated into a disease management program without limiting worker re-entry and harvesting schedule.
- New flexibility and choice to address sustainable crop production challenges such as managing the number and level of residues in produce.
- Opportunity to succeed despite increasingly demanding crop production specifications.

MEETING EXTERNAL DEMANDS

- The biological fungicide **Serifel®** provides conventional growers with a unique solution for unmet needs in the food production value chain.
- When used in integrated spray programs, it acts as a highly effective, broad-spectrum biological fungicide.
- It has a positive toxicological and environmental profile that makes it very safe for users, the environment, and consumers.

BASF
We create chemistry

We as BASF put in your hands the right tool for balanced protection.

Serifel®