



**BERRISYS**

**Keeping berries fresher for longer**



**AgroFresh**

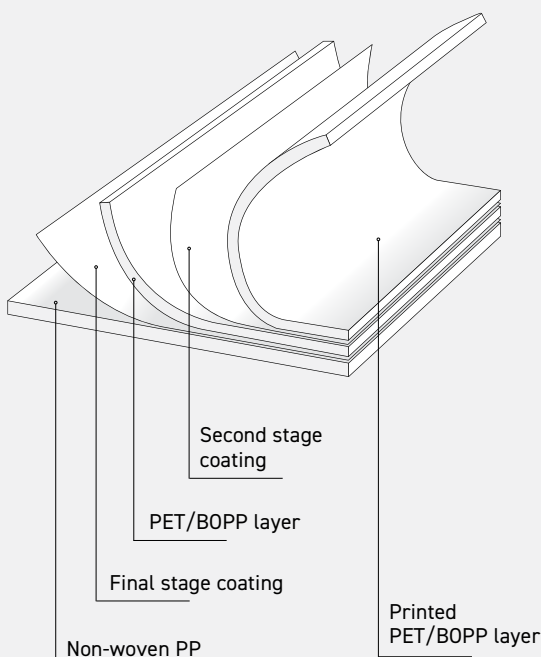
## INTRODUCTION TO AGROFRESH

AgroFresh is the global leader in delivering innovative post-harvest solutions that answer real business challenges every step of the produce supply chain. With 40+ years of innovation, AgroFresh was the first to introduce 1-MCP technology for ethylene management with SmartFresh™, as well as developing Berrisys™, the leading laminated SO<sub>2</sub> generating sheet designed to protect berries from post-harvest fungal decay. AgroFresh offers digital monitoring, intelligent packing solutions, and plant-based coatings. They empower growers, packers, and retailers to deliver quality produce worldwide.



## WHAT IS A BERRISYS SO<sub>2</sub> SHEET?

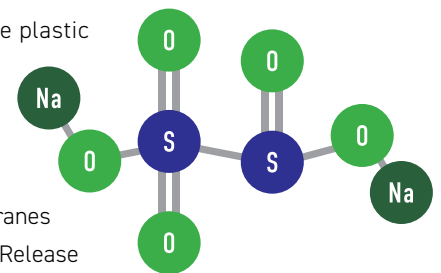
Berrisys consists of a sequence of laminated plastic membranes in either dual-release or single-stage release, each bonded by a layer containing precise concentrations and particle sizes of sodium metabisulfite Na<sub>2</sub>S<sub>2</sub>O<sub>5</sub>.



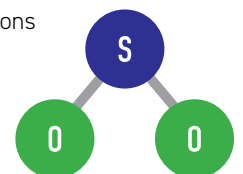
## SODIUM METABISULFITE

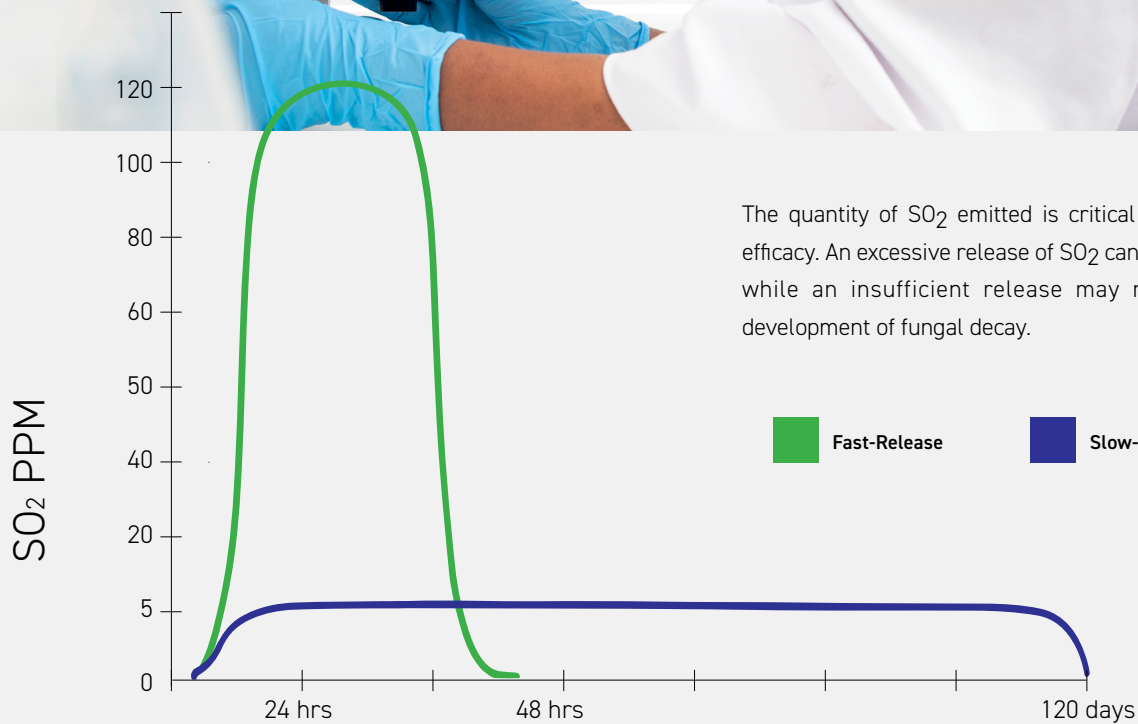
An inorganic compound of the chemical formula Na<sub>2</sub>S<sub>2</sub>O<sub>5</sub> sometimes referred to as sodium metabisulfite. On contact with water (H<sub>2</sub>O) vapour, expressed as relative humidity, sodium metabisulfite releases sulphur dioxide: SO<sub>2</sub>, the primary active ingredient of our products.

The top and middle plastic membranes sandwiches the Slow-Release layer. The middle and bottom membranes sandwich the Fast Release layer. At 70% and above relative humidity, an autocatalytic reaction is initiated, whereby the sheet starts releasing a time and concentration-varying stream of SO<sub>2</sub>.



Sulphur dioxide, SO<sub>2</sub>, is a colourless gas with a sharp, salty smell. It is particularly effective against *Botrytis cinerea* and functions as a preservative. To note: SO<sub>2</sub> is heavier than air and will always gravitate towards the bottom of a container or area.





The quantity of SO<sub>2</sub> emitted is critical to the product's efficacy. An excessive release of SO<sub>2</sub> can cause bleaching, while an insufficient release may not prevent the development of fungal decay.

■ Fast-Release      ■ Slow-Release

This graph is for illustrative purposes only and shows the release of Berrisys DR B

## HOW DOES IT WORK?

The **Fast-Release** disinfects the surface of the berries, by releasing enough SO<sub>2</sub> over a 24-to-48-hour period to kill and eliminate any actively growing *B. cinerea* fungal spores and mycelia.

The **Slow-Release** layer remains active for up to 120 days. It emits a low, continual dose of SO<sub>2</sub> gas, concentrated enough to inhibit any superficial latent *B. cinerea* spores from growing but also low enough

to ensure sulphite residues within the berries remain safely below the legal limit of 10 ppm. Infection at flowering could still develop but will be contained to the affected berries.

The quantity of SO<sub>2</sub> emitted is critical to the product's efficacy as an excessive release of SO<sub>2</sub> can cause bleaching, while insufficient release may not prevent the development of *Botrytis*.

For more detail on the chemical reactions please visit the Research page at [www.agrofresh.com](http://www.agrofresh.com)



Product	SO <sub>2</sub> Release	Recyclable	Sheet Size (mm)	Box size (mm)
 <p><b>Dual Release Blue</b></p> <p>A fast release (first stage) and slow release (second stage), specifically developed for berries packed without liners/shrouds to reduce <i>Botrytis</i> (grey mould) up to 42 days without causing SO<sub>2</sub> damage.</p>	Dual Release Fast >48hr Slow >120 Days	n/a	300 x 208	310 x 230
			370 x 208	395 x 240
			356 x 260	400 x 300
			460 x 260	500 x 300
			530 x 350	600 x 400
 <p><b>Dual Release Lite</b></p> <p>Release a lower dosage of SO<sub>2</sub> during the fast release (first stage) compared to Dual Release Blue to protect blueberries from <i>B. cinerea</i> (grey mould) for up to 42 days. Designed for berries packed loose and in open top punnets (bulk packaging) that require liner bags or pallet shrouds.</p>	Dual Release Fast >48hrs Slow >120 Days	n/a	300 x 208	310 x 230
			370 x 208	395 x 240
			356 x 260	400 x 300
			460 x 260	500 x 300
			530 x 350	600 x 400
 <p><b>Dual Release Recyclable</b></p> <p>The first fully recyclable SO<sub>2</sub> generating sheets based on the same formulation as Berrisys Dual Release Blue. Product protect blueberries against <i>B. cinerea</i>, for up to 42 days and it can be used for berries packed in clamshells or open top punnets without liners or shrouds.</p>	Dual Release Fast >48hrs Slow >70 Days	✓	300 x 208	310 x 230
			370 x 208	395 x 240
			356 x 260	400 x 300
			460 x 260	500 x 300
			530 x 350	600 x 400
 <p><b>Dual Release Lite Recyclable</b></p> <p>Fully recyclable SO<sub>2</sub> generating sheet based on the same formulation as Berrisys Dual Release Lite to protect blueberries from post-harvest fungal decay, <i>B. cinerea</i>, without harming the environment, up to 42 days. Used for blueberries enclosed in liner bags or pallet shrouds.</p>	Dual Release Fast >48hrs Slow >70 Days	✓	300 x 208	310 x 230
			370 x 208	395 x 240
			356 x 260	400 x 300
			460 x 260	500 x 300
			530 x 350	600 x 400
 <p><b>Single Release Recyclable</b></p> <p>Fully recyclable SO<sub>2</sub> generating sheet with only a fast release for protection against <i>B. cinerea</i>. Product can be used with and without &gt;0.2% ventilated liners. Protects raspberries/blackberries up to 5 days and blueberries up to 10 days during storage/transport.</p>	Single Release Fast >48hr	✓	300 x 208	310 x 230
			370 x 208	395 x 240
			356 x 260	400 x 300
			460 x 260	500 x 300
			530 x 350	600 x 400

Above table shows standard sizes. Custom sizes available on request.





## KNOW YOUR ROT

Rot Type	Symptoms	Infection
<i>Botrytis</i> (grey mould)	Causes brown spots on leaves. Infected berries are covered with white fluffy growth that turns grey.	Causes infection on wounded berries. Infects through spores that are distributed with the wind/water droplets.



## FAQ'S

### What is the difference between Berrisys, Berrisys DR L and Berrisys DR L Recyclable?

Berrisys Dual Release Blue emits a higher dosage of SO<sub>2</sub> during the fast release stage compared to the Lite versions.

### When do I use Berrisys or Berrisys DR L?

- Berrisys Dual Release- Used when there are no liner bags/shrouds in the carton/crate or around the pallet
- Berrisys Dual Release Lite products - used in combination with a carton/crate liner bag or pallet shroud

### How many Berrisys sheets are used per carton/crate?

- We recommend one Berrisys DR L sheet per carton crate on bulk-packed fruit
- We recommend one Berrisys sheet per layer of punnets on fruit packed in punnets

### How do you use Berrisys products?

Place Berrisys with the printed side facing up on top of the fruit inside the box/liner bag (if a liner bag is used).

### Can Berrisys be applied during field packing?

Yes, it can be applied during field packing, but also during packing in a pack house or shed.

### How should I store Berrisys?

Please store Berrisys in a normal warehouse or packing material store that is properly roofed and sealed to remain below 25° C, dry and out of direct sunlight.

### How do Berrisys products work?

Berrisys is activated by moisture/humidity of 70% RH and more, and this typically happens when Berrisys is placed on top of the fruit (fruit respiration produces moisture).

### How does it kill a fungus?

Activated Berrisys releases a low dose of sulphur dioxide gas (SO<sub>2</sub>) which is highly effective in killing/controlling fungal pathogens - especially *Botrytis cinerea* (Grey Mould) which is a primary pathogen of fruit.

### Where in the sheet is the SO<sub>2</sub>?

Berrisys does not actually contain SO<sub>2</sub> or sulphur as a raw ingredient. SO<sub>2</sub> is generated by means of a chemical reaction between water (H<sub>2</sub>O) and sodium metabisulphite.

### Can you leave the Berrisys pack open when not packing?

No, when you are done packing, please ensure that that pack is properly closed with tape.

### If I open the Berrisys pack, do I have to use all of it at once?

Each pack (outer bag) contains two inner bags. Every bag is vacuum-sealed. Once you open a bag and start to use Berrisys - you do not have to use all the sheets - remove what you need and fold the plastic bag over (we make them extra-long so you can do this) and seal with tape.

### Is Berrisys legal to use locally and for export on blueberries?

Yes, it is legal to use in most countries (e.g. South Africa) and safe to use for export if the maximum residue level (MRL) is below 10 parts per million (ppm). Berrisys treated fruit are well within the safety limit of 10 ppm.

### What size Berrisys do I need?

Use a size that fits your box/crate size and covers at least 80% of the surface area.

Box Size (mm)	Sheet Size (mm)	Berrisys/Pack
310 x 230	300 x 208	1500
395 x 240	370 x 208	500
400 x 300	365 x 260	1000
500 x 300	460 x 260	500
600 x 400	530 x 350	500

### Is Berrisys recyclable?

Yes, it is recyclable as a code 7 (other plastics), but we are currently working on a curb-side recyclable version that will be even more environmentally friendly as a code 5 (PP/polypropylene).

### Is Berrisys the same as Uvasys?

No, although the two products are both manufactured by AgroFresh, the formulations are different and Berrisys is designed for use with blueberries and Berrisys Fast Release for raspberries and blackberries, while Uvasys is used with table grapes only. They should not be used other than as recommended.

### What happens with Berrisys if there is a mechanical problem with my container?

Hopefully this does not affect the temperature of the fruit too much. This will affect the fruit quality much more than the efficacy of Berrisys.

### Is Berrisys/AgroFresh BRC-registered?

Yes, Berrisys and AgroFresh are BRC registered and a copy of our latest BRC certificate is available upon request.



## FAQ'S

### What is bleaching?

Bleaching occurs when  $\text{SO}_2$  bonds with water. This is usually on the surface of the produce where condensation forms water droplets. When enough  $\text{SO}_2$  is dissolved into these droplets they become acidic, forming a mild sulphuric acid. This in turn then bleaches the affected area and the colour is removed. Berrisys is specifically designed and formulated to avoid this, but it is always safer to avoid packing wet fruit for many reasons.  $\text{SO}_2$  damage normally occurs around the stem scar of blueberries if  $\text{SO}_2$  concentrations are too high.

### What if I don't use all the Berrisys sheets this season/year. Can I use them next season?

Berrisys sheets are durable, and as long as they are stored according to recommendation (e.g. in a packing material store), they will be usable for at least three years after the manufacturing date. Every sheet is printed with a batch number, manufacturing date and use-by date. Even if some Berrisys remain unused after this period – you are welcome to contact AgroFresh – we'll re-test our retention samples to reassure you that the product is still functional.

## BERRISYS TIPS

- Please note that the optimum ventilation type and size will depend on your unique combination of: Production area; Cooling systems; Post-harvest handling times; Pack type (loose, punnets, carry bag, etc.)
- Depending on the layers of blueberries packed in a box on each layer put one Berrisys sheet
- For blueberries packed loose, use one Berrisys Lite sheet recommended for the carton size
- For blueberries packed in open-top punnets and enclosed in liner bags or pallet shrouds, use one Berrisys DR L sheet depending on the layers
- Use the correct size Berrisys sheet for the carton size
- Use the correct type Berrisys sheet for the pack style (Refer to Berrisys Type table)
- Do not pack damaged/bruised/wet berries
- Transfer berries to cold storage as soon as possible
- Do not break the cold chain as this damage's quality
- Breaks in the cold chain or incorrect post-harvest temperature management are detrimental to fruit quality and can cause increased levels of  $\text{SO}_2$ , which could result in bleaching of the fruit
- Place a moisture absorbing membrane (MAM) on top of the Berrisys DR L sheet in case of excessive condensation to absorb and lock excess moisture from the  $\text{SO}_2$
- Berrisys Lite Recyclable & Berrisys Fast sheets are made with Polypropylene (PP) and are fully recyclable

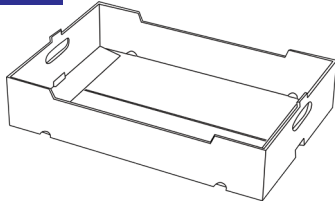




# PACKAGING INSTRUCTIONS

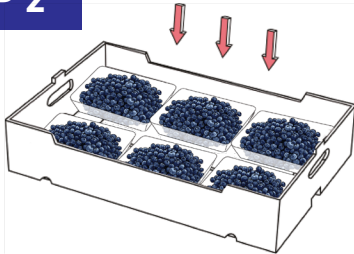
Berrisys

## STEP 1



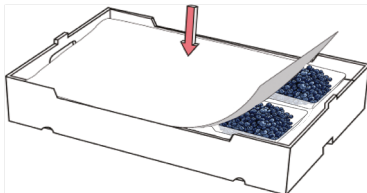
Use the Berrisys sheet recommended for the corresponding carton size. See the table on Page 7 for more information.

## STEP 2



Place punnets inside the carton. Heat sealed or clamshells may be used. If packing multiple layers, use one sheet per layer.

## STEP 3



Place the Berrisys sheet on top of the produce, with the printed (shiny) side facing up. Do not cut or modify the sheet

**Please Note:**

Always use the Berrisys sheet recommended for the corresponding carton size.  
Suggestion: We recommend the use a MAM above and an appropriate hydrophobic top sheet below the Berrisys sheet if you are expecting excessive condensation.

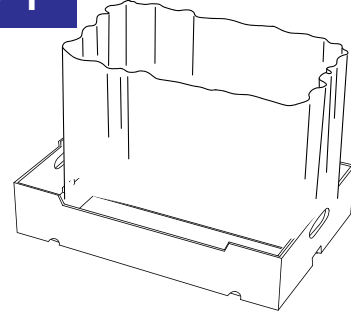
# STORAGE INSTRUCTIONS:

- Store Berrisys sheets in the sealed, original packaging in a cool (below 25°C) dry area, out of direct sunlight
- Unused Berrisys sheets can be used the next season and not later if stored correctly in resealed plastic bags
- Each sheet has a printed Batch Number for full traceability

# PACKAGING INSTRUCTIONS

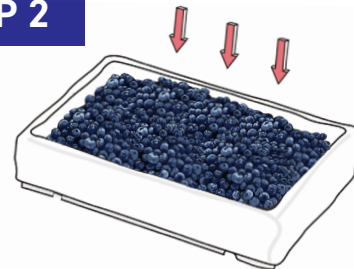
Berrisys Lite and Berrisys Lite Recyclable

## STEP 1



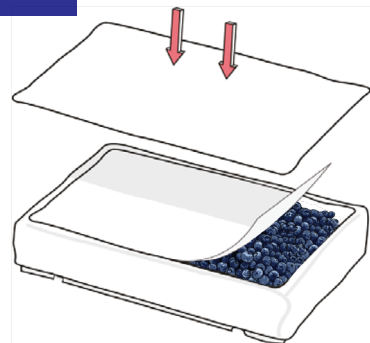
Line the carton with a perforated liner bag. Fold open the liner bag once correctly positioned inside the carton.

## STEP 2



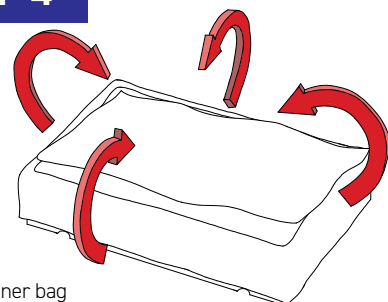
Place the berries inside the liner bag.

## STEP 3



Place Berrisys Lite sheet printed side facing upwards. Place MAM sheet on top if excessive moisture is expected.

## STEP 4



Close inner bag

# AgroFresh

## CONTACT US

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FEBRUARY 2024

