

Postharvest quality and packaging of table grapes - an overview

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Expertise in applied research and services on a commercial level

Decay control and Quality maintenance

ExperiCo encourages two concepts

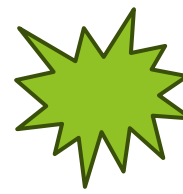
- **12-point quality maintenance strategy**
- **Risk management system (RMS)**

Entail actions across the entire handling chain:

- **Prior to harvest**
- **At harvest**
- **At packing, which includes packaging materials**
- **Cooling**
- **Storage and marketing**



12-Point strategy



(10) Packing / packaging materials

- Use appropriate packaging materials for specific needs
- Know what influence packaging may have on grape quality
- Maintain a balance between the strategy / packaging used and the possible positive / negative impact on grape quality



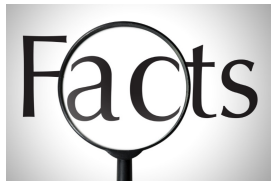
Quality parameters to be managed in marketing table grapes

- Post-harvest decay
- Berry shatter (loose berries)
- Berry softening / crispiness
- Berry discolouration – internal and external
- Weight loss / shriveling
- Rachis and stem desiccation (browning)
- Berry cracking (berry split)



Decay development - some facts

- Most important post-harvest defect of table grapes affecting quality
- Various causal pathogens are involved, such as *Botrytis*, *Alternaria*, *Rhizopus*, *Penicillium*, soft-tissue-breakdown, etc

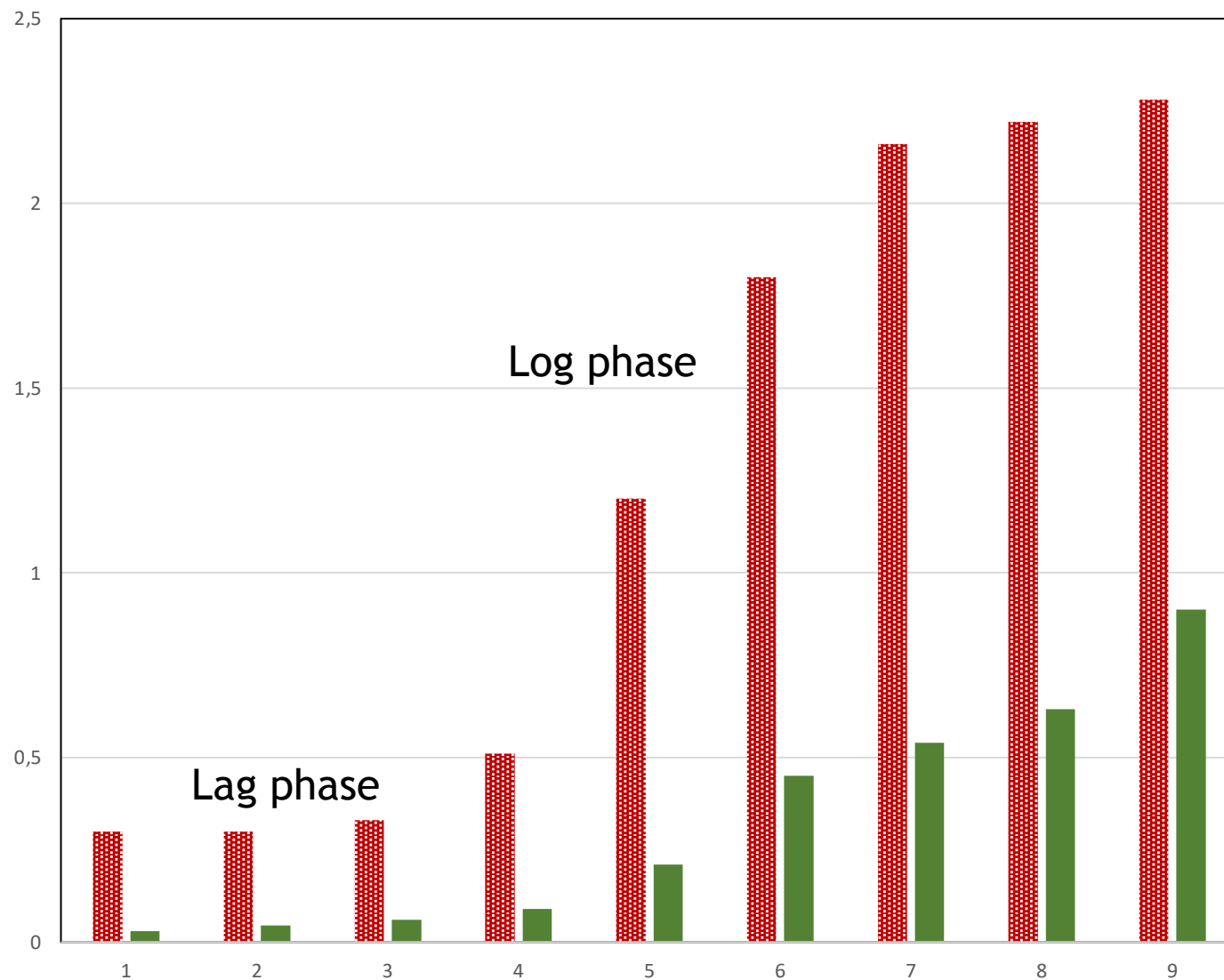


Proven by R & D (own and abroad)

- **High humidity / free water**, predisposes fungal development
- **Cooling** and the maintenance of the cold-chain, influences decay development
- The **type of packaging material** and the specific use may influence decay development

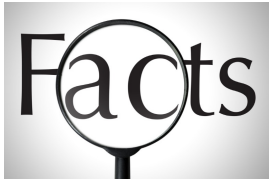


Decay development - what to prevent / manage ?



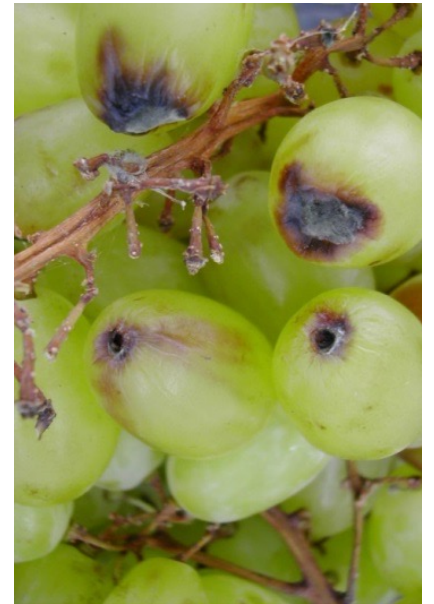
Stems / rachis browning (desiccation) - some facts

- Often seen as 2nd most important defect besides decay



Proven by R & D (own and abroad)

- **Green stems** indicates freshness
- Mostly **associated with moisture loss**, but also natural senescence, SO₂ damage and fungal colonisation
- Stem desiccation is a given during cooling and storage
- **tempo and duration of cooling** will affect the degree of desiccation
- **Packaging** may influence stem desiccation

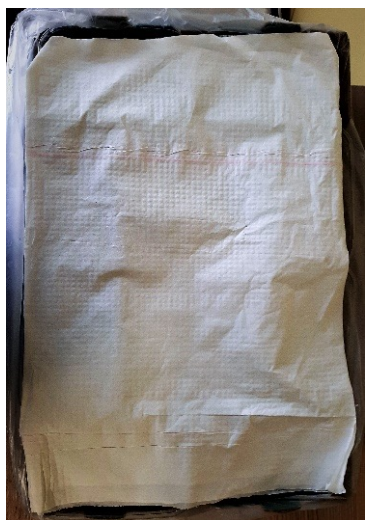
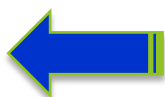
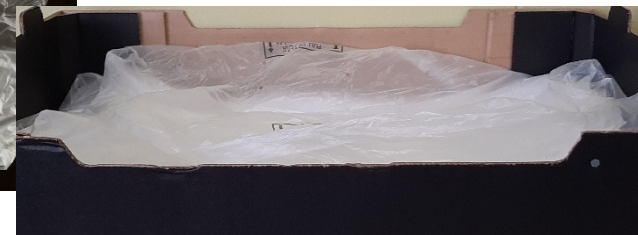
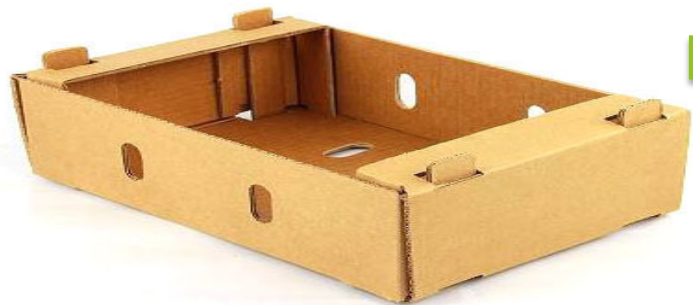


Stem desiccation (continued)

- SO₂, used to preserve table grapes during storage, may contribute towards stem desiccation
- Perforated bags are used to curb berry cracking, however, it may negatively impact on stem browning / desiccation if too vented
- Time-lapse between packing and onset of cooling affects stem browning
- FAC, delivery air temperature and duration may affect stem desiccation / desiccation if too vented
- *Alternaria* rot, occurring pre- or post-harvest, are often associated with dry, dehydrated stems



Packaging material generally used



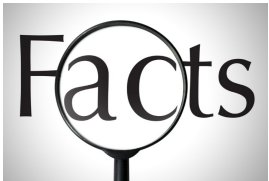
The carton / box

Objective

- Protection of produce
- Transport unit
- Marketing differentiation

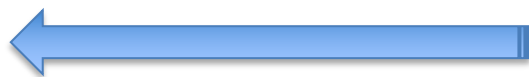
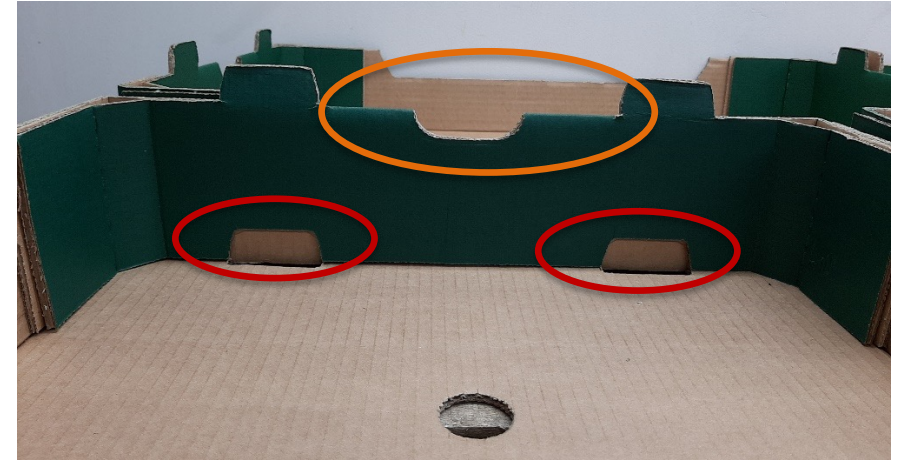


Relation to quality



- Air vents
 - Influences cooling ability / tempo;
hence reducing respiration and natural senescence
can impact negatively on the condition of stems and the rachis
- Structure
 - Influences strength / bottom and side bulging, also collapse
hence bruising, injuries, therefore splits and decay development

Vents in the carton in relation to air-flow during forced-air cooling



Direction of air-flow

The outer bag / liner

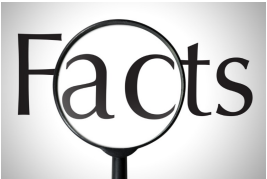
Objective

- Protection of produce
- Quality maintenance

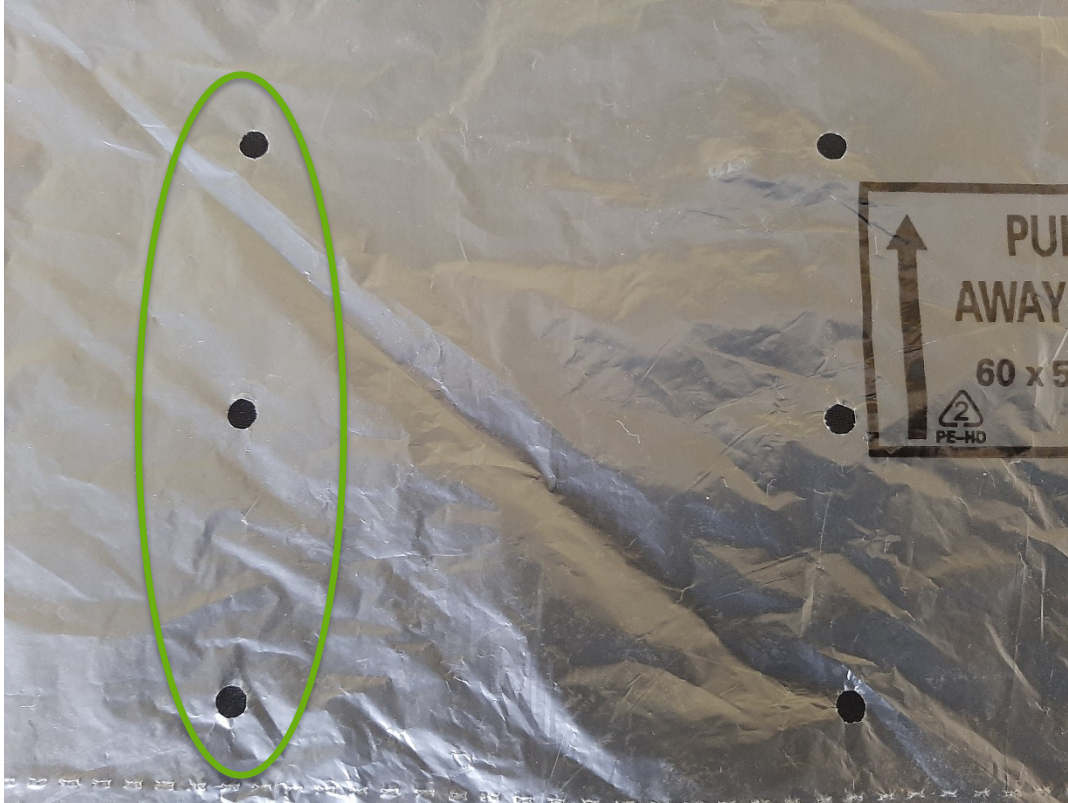


Relation to quality

- Air vents ; number and size = ventilation area
- Influences cooling rate / tempo
hence respiration and transpiration
therefore the natural senescence and stem condition
- Influences the relative humidity
hence free water from condensation,
therefore spore germination and decay development,
also the level of SO₂ release and damage
also berry split and rachis condition / drying



Outer bag / liner bag - Perforations



The number and size matters
(what % is effectively open)



Slower cooling and more
condensation

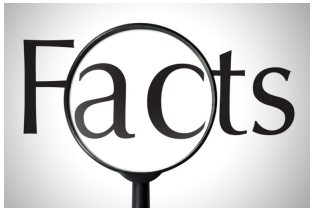
The Bunch carrier

Objective

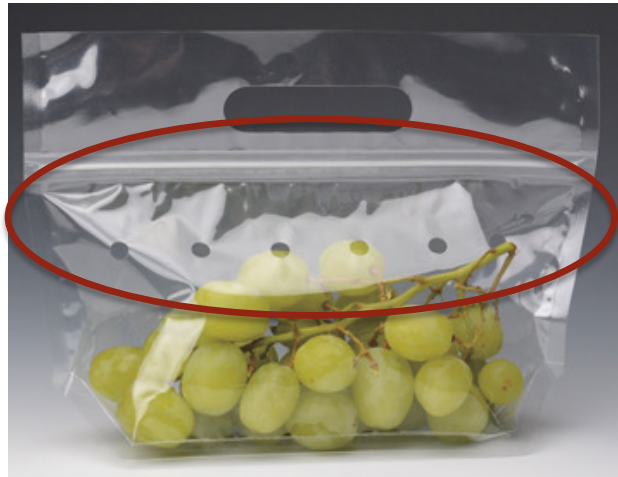
- Protection of produce
- Marketing

Relation to quality

- Openings / holes or slits; number, size and positioning of importance
 - Influences cooling tempo, hence respiration and transpiration, therefore natural senescence of grapes
 - Influences SO₂ distribution, often acting as a barrier, therefore increased decay development



The bunch carrier



The moisture absorber

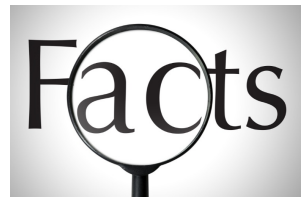
(“Moisture Absorbing Material = MAM”)

Objective

- Protection of produce
- Absorption of free water

Relation to quality

- Characteristics / type of material, absorbing capacity
- Influences free water from condensation through passive absorption, hence berry cracking and germination of conidia
- Influences SO₂ levels, hence decay control and SO₂ bleaching
- Placement important – above SO₂ sheet for reducing free water; below to reduce SO₂ levels and minimise possible crystals on berries



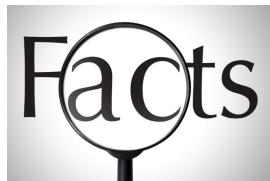
The SO₂ sheet

Objective

- Decay control and preservation / quality maintenance

Relation to quality

- Type, strength, size and placement position is of importance



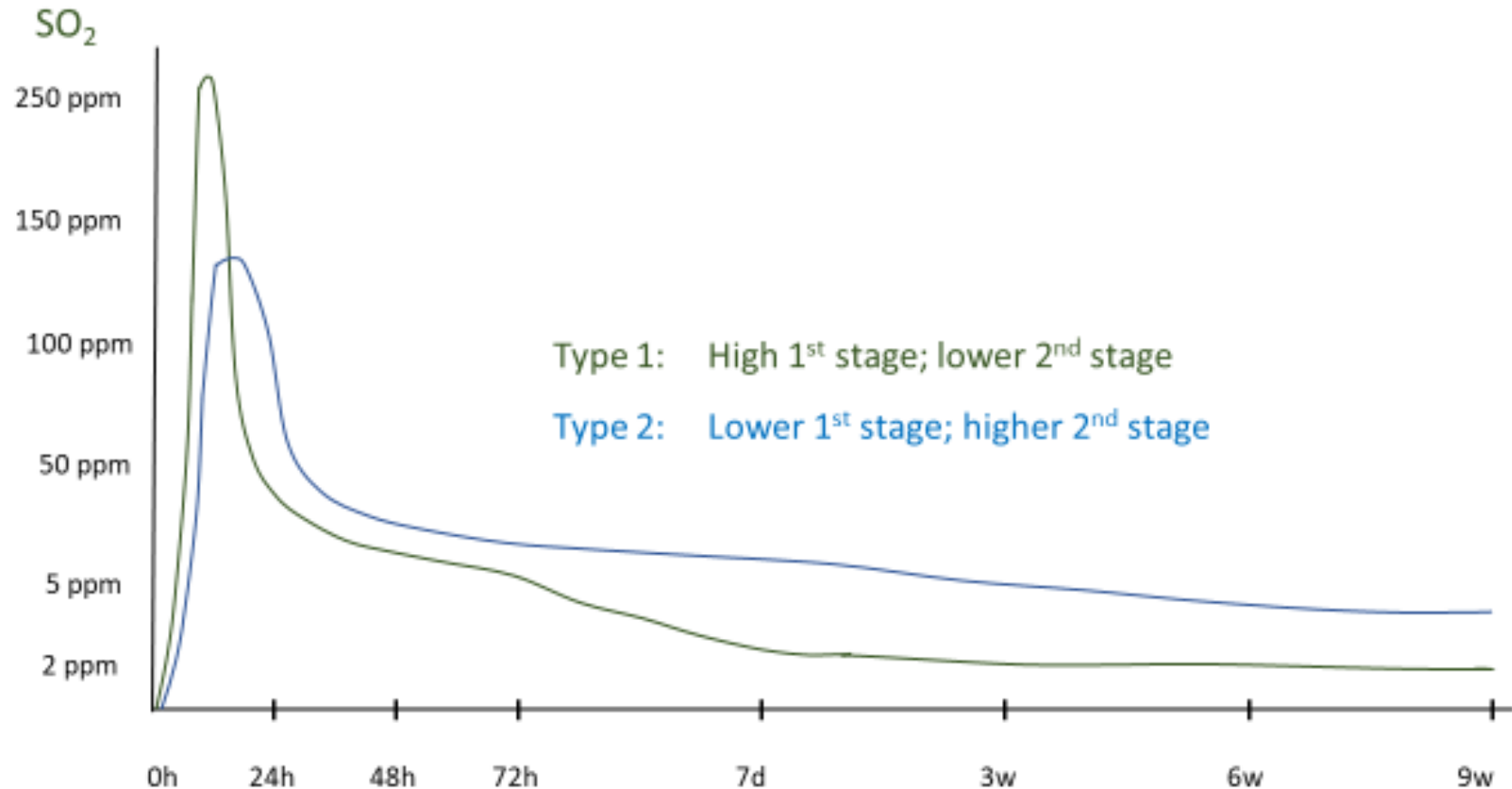
Influences SO₂ emission / the concentration per emission phase, hence inhibits spore germination and inhibition of superficial growth on the berry surface, as well as emergence from inherent infections, therefore spread to adjacent grape berries

- Influences SO₂ emission, the concentration per phase, hence SO₂ levels, therefore SO₂ damage and berry split



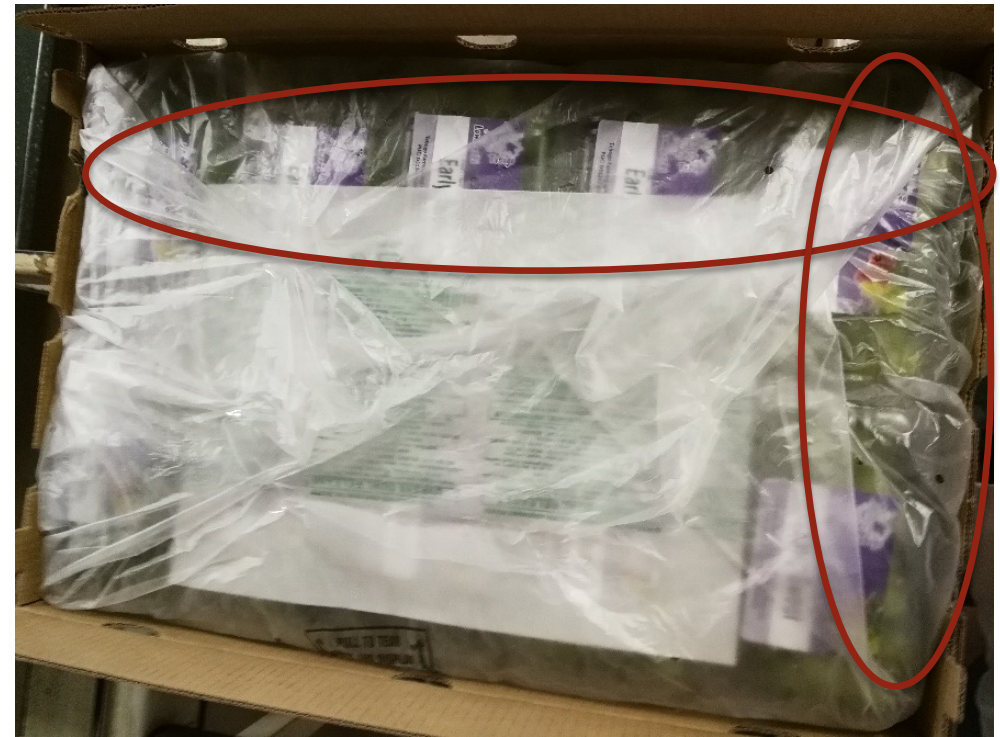
The SO₂ sheet

- RSA en Chilean sheets / pads are mostly used by grape growers world-wide
 - SO₂ emission differ between the different types
 - peaks and maintenance of critical levels differ
 - and hence the efficiency to control / limit decay, SO₂ damage, as well as berry splits / cracks

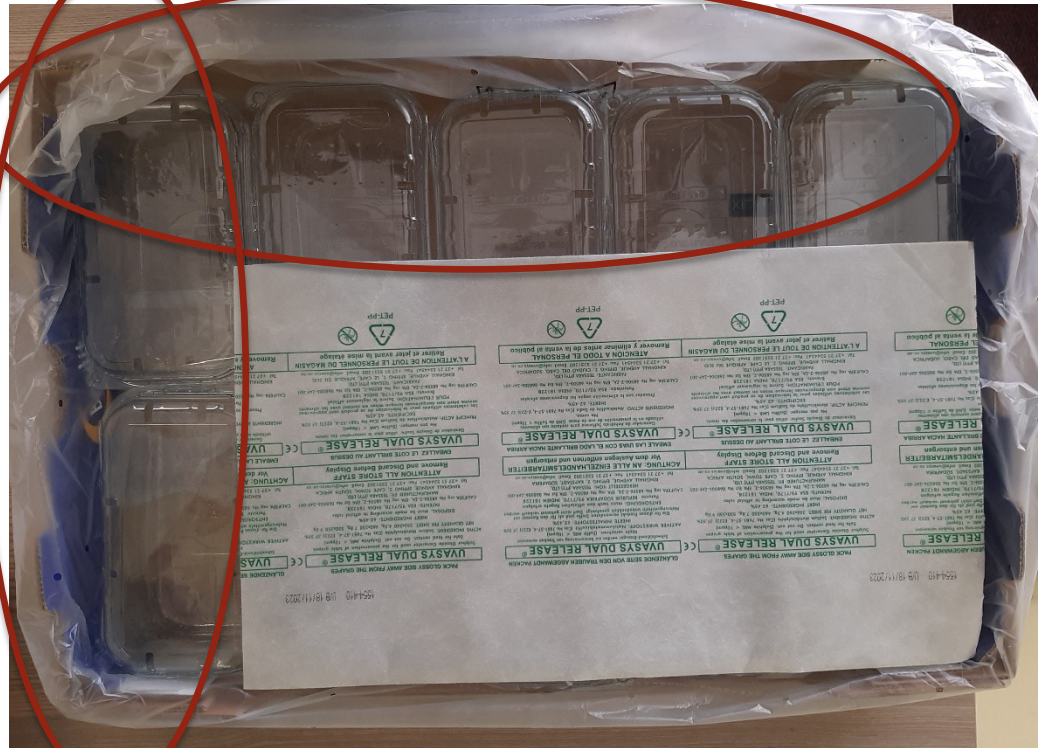


Placement / size of SO₂ sheet

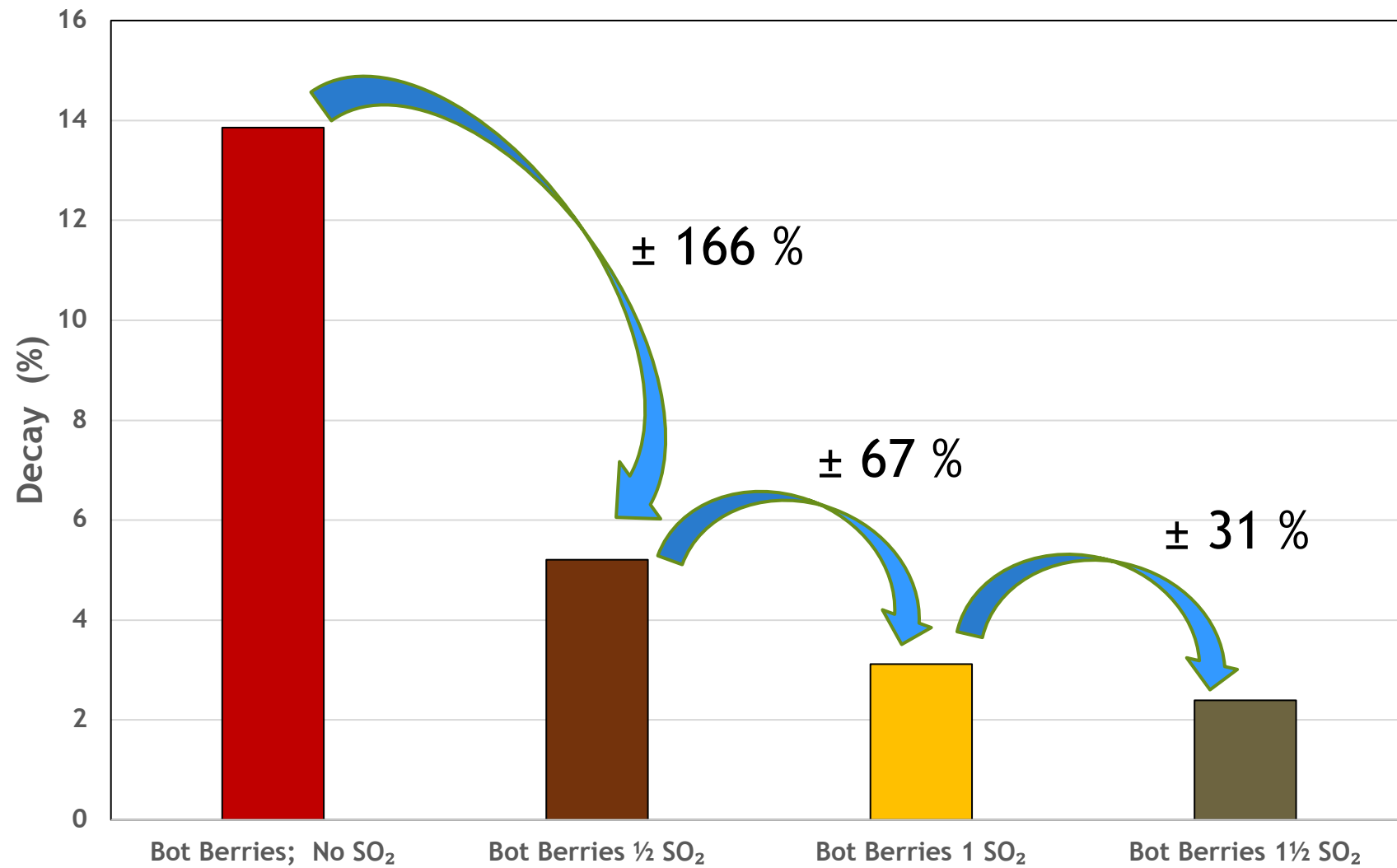
**Needs to cover the entire surface
of the packed grapes !**



**Elevated decay levels in
uncovered areas**



Reduction of the spread of decay from infected berries



Choose the right packaging material for your objective

- The wrong decision may have a negative outcome on grape quality
- Be aware of differences between products



All stake holders, from production to packing and marketing, has a responsibility to maintain quality, until the grapes are consumed