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PROEFCENTRUM FRUITTEELT VZW

Successful cold storage of blackberry and raspberry plants

Femke De Vis - Researcher soft fruit

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PROBLEMS

"Cold storage of plant material is expensive and risky. The development of a good strategy that **limits plant quality loss** due to refrigeration is therefore important."

=> **Guidelines**

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PLANT MATERIAL

GUIDELINES PLANT MATERIAL

- ❖ Start with a healthy plant
- ❖ Use a preventative spray schedule containing at least three fungicides, with proven efficacy against stem diseases and Botrytis.

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DEFOLIATING BEFORE COOLING

GUIDELINES DEFOLIATING


- ❖ Defoliate the plant material before cooling via leaf cutting or leaf blowing (especially for long storage).
- ❖ Remove organic material on the top of the plant container.
- ❖ Disinfect pruning shears with alcohol so that no fungi are transferred via leaf cutting.

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PACKING METHOD

- More chance of fungal attack at high RH or wet crop (rain)
 - Pack in dry conditions
- Respiration
 - Oxygen
 - CO₂, heat and moisture



GUIDELINES PACKING METHOD

- ❖ Pack in dry weather
- ❖ Use perforated foil and stretch foil as packing material
- ❖ Definitely do not use a fully sealed bag.

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PACKING METHOD



DO NOT USE A FULLY SEALED BAG !
Up to 30% less bud break compared to standard




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COOLING STRATEGY


"Which cooling strategy gives us the least plant loss and the highest production?"

GUIDELINES COOLING STRATEGY

- ❖ Use a dynamic chilling pattern, independent of storage duration
 - ❖ Dropping in too large increments creates a temperature shock causing chill injury and plant losses
- ❖ Final temperature depends on the duration of storage
- ❖ Do not chill lower than -1.5 °C air temperature
- ❖ Monitor plant activity weekly (dynamic drop when plant becomes active).
- ❖ Measure product temperature with sensors in the substrate.
- ❖ Temperature differential: high versus low.

Week	Air temp. (°C)
START	2
Week 1	1,5
Week 2	1
Week 3	0,5
Week 4	0
Week 5	-0,2
Week 6	-0,4 (pot temp. +/- 0°C)
Week 7	-0,6 (pot temp +/- 0°C)
...	-0,6
Week ?	-0,8
Active plant	-1
	-1,2
	-1,4
	-1,5



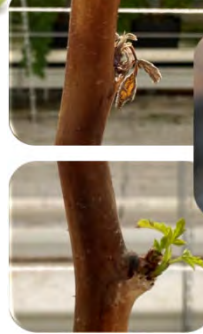
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COOLING STRATEGY

Damage caused by cooling






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BELORITA

COOLING STRATEGY

- Raspberry, 8 months cooling, 2,5 plants/m²

from 0°C to -1,8°C from 0°C to -1°C and later to -1,8°C from 0°C to -1°C

BUD BREAK: 21% (b) 29% (b) 63% (a)

Standard: Dynamically to -1°C

Average 70-95%

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EFFECT CO₂ IN STORAGE

High CO₂ concentration during storage is detrimental to bud break and production

- 5% CO₂ : 15% production loss
- 10% CO₂ : 25-35% production loss

BUD BREAK: 83% 52% 27%

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EFFECT CO₂ IN STORAGE

"Plant respiration can sharply increase the CO₂ concentration in the cold store!"

+ 0,1% CO₂ /day

- Plant respiration
- Microbial life + Substrate

=> Ventilate the cold store

VCBT: In a fully gas-tight cold store (570 m³) filled with blackberry plants (70 boxes, each containing 80 plants) the CO₂ concentration increases 0,1% per day at 0°C.

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EFFECT CO₂ IN STORAGE

GUIDELINES GAS COMPOSITION COLD STORE

- ❖ High CO₂ concentration is detrimental to bud break and production of blackberries and raspberries. Lower O₂ concentration has no benefits.
- ❖ Open the cold store regularly.
- ❖ Do not invest in a controlled atmosphere.
- ❖ Use perforated packing material to avoid gas accumulation around the plant.
- ❖ Defoliate plant material to reduce plant respiration and CO₂ release.

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Guide: preservation of plant material for cold storage

Teelt- en bewaargids
Opkweek en bewaring van plantmateriaal van frambozen en bessen

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Thank you for your attention !

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