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Agroscope

Influence of the innovative HDCold® air-cooler technology on fruit quality

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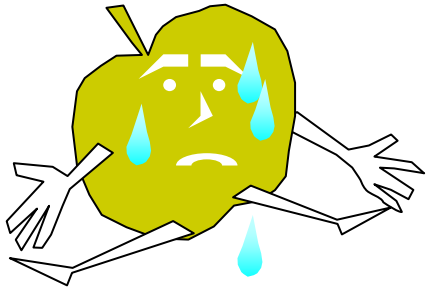
Postharvest Symposium 2024

Fresh fruits are living tissues that continually release water after harvest, especially in environments with low relative humidity

- Substantial losses of water can lead to:
  - **degradation** of the overall fruit **quality** (shriveling, wilting, loss of texture,…)
  - **Loss of market value** of the fruits
  - **Loss of sealable weight**
  - **Lower incomes** for growers and all actors of the supply chain



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Water losses after harvest are influenced by numerous factors

- **Fruit-specific characteristics**
  - Skin and cuticle properties
  - Composition
  - Size
  - Metabolic activity,…
- **Factors related to the orchard and its management**
  - Weather conditions
  - Method of irrigation
  - Use of certain pesticides that can alter the cuticle
  - Maturity at harvest
  - Physical injuries, micro-cracks, bruising,…
- **Storage conditions**
  - Temperature
  - Relative humidity
  - Airflow,…

The innovative HDCold® algorithm and air-cooler technology enables storing fruit at high humidity levels

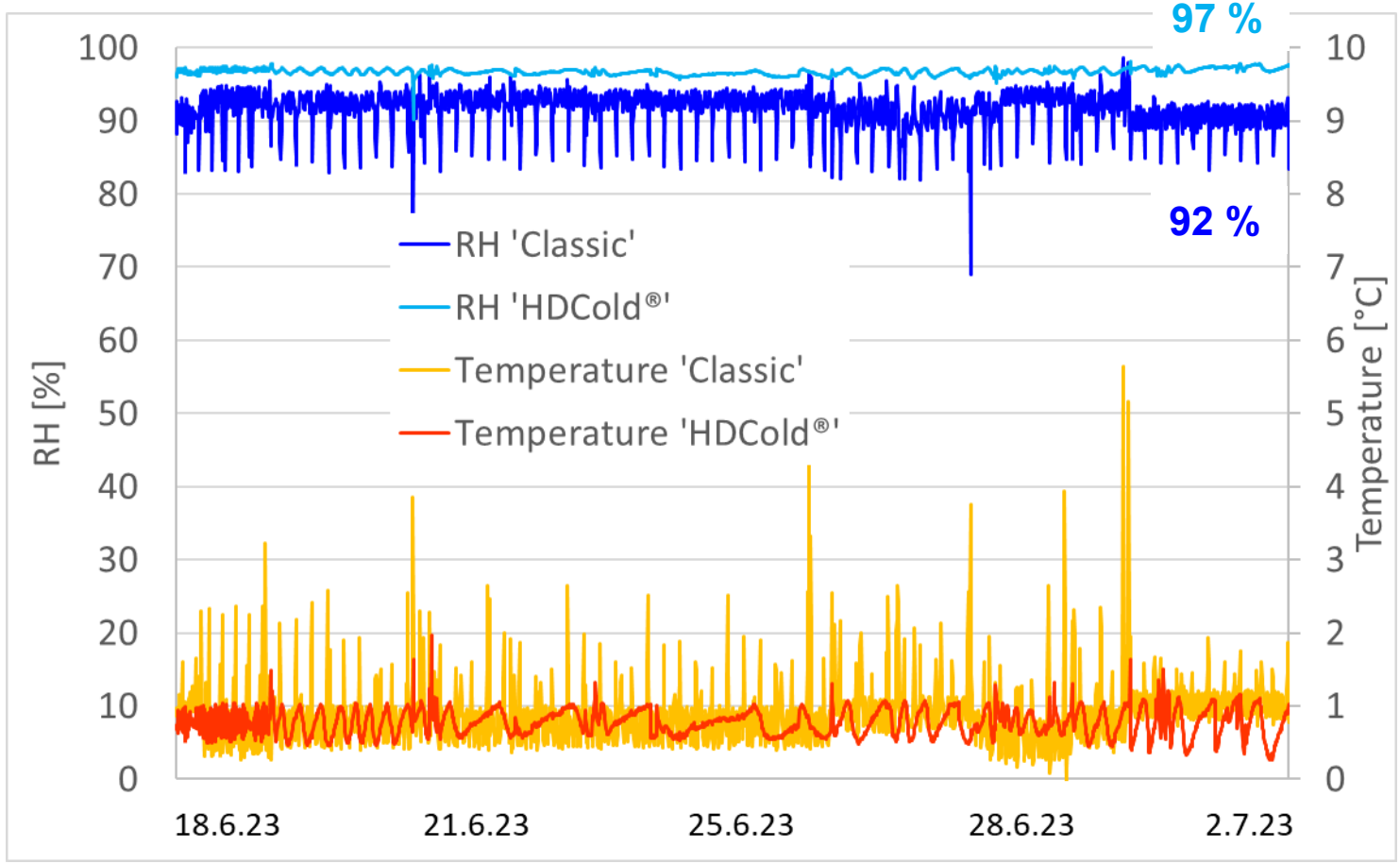
- **HDCold® Technology** (DPKL, France):
  - keeps fresh produce at **high, stable humidity** (up to 100%) **without humidification or the need of defrosting**, at temperatures above 0 °C.
  - Operates in **regular** and **controlled atmosphere** (RA and CA).
  - Limit the **variations of temperature** and the formation of **condensation**
  - Allows **energy savings**

Can postharvest weight losses be reduced with HDCold® technology without negatively impacting fruit quality and fostering decay?

- Storage trials conducted on **apples**, **pears**, **cherries** and **apricots**
- Storage in regular (RA) or controlled atmosphere (CA, only pome fruit) in cold rooms at 1 °C equiped with:
  (1) **Classic** air-coolers
  (2) **HDCold®** air-coolers
- Evaluation on:
  - Weight loss
  - Quality (firmness, color, total soluble solids, acidity)
  - Decay
  - Physiological disorders (cracks and scald)

Fruit	Atmosphere	Storage duration
Apples	RA	6-7 months
	CA	8 months
Pears	RA	7 months
	CA	8 months
Cherries	RA	2 weeks
Apricots	RA	2 weeks

RH and temperature were more stable with HDCold®



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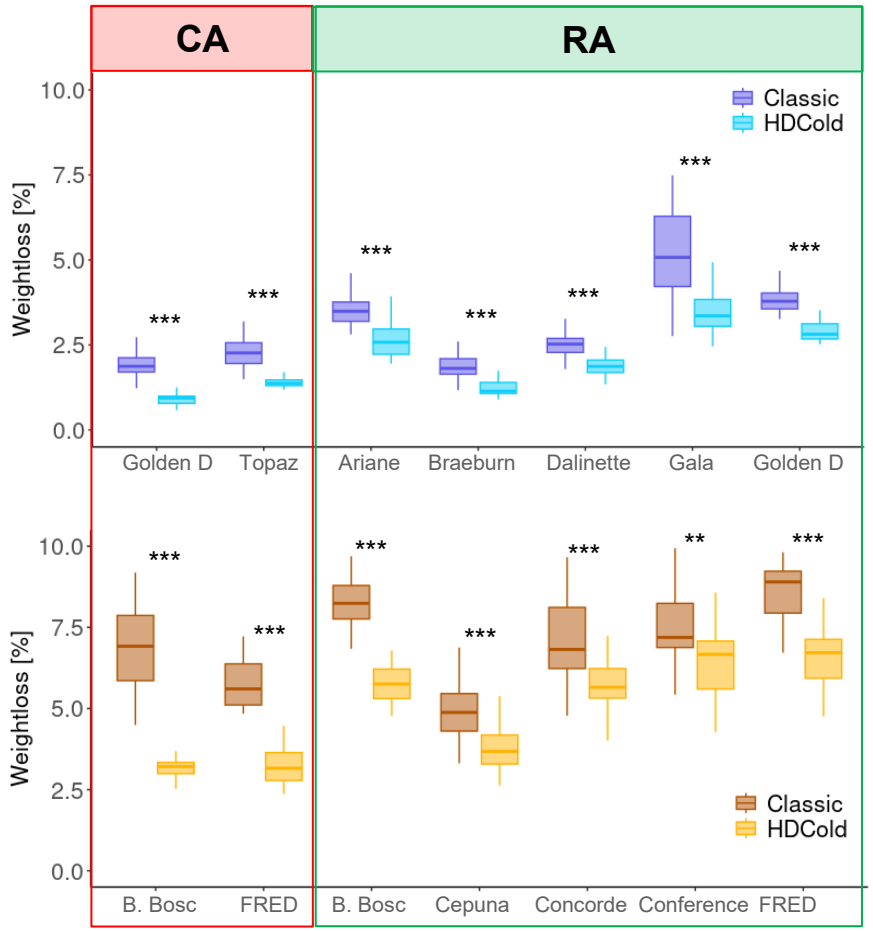
For all tested pear and apple cultivars, weight losses were reduced by 26 to 48 % with HDCold®

	Average weight loss [%]	
	CA	RA
Classic	2.1[a]	3.4[a]
HDCold®	1.2[b]	2.5[b]

-43% -26%

	Average weight loss [%]	
	CA	RA
Classic	6.4[a]	7.4[a]
HDCold®	3.3[b]	5.5[b]

-48% -26%



*Significant at ***: p≤0.001 and **: p ≤0.01 according to the Student's T-test*

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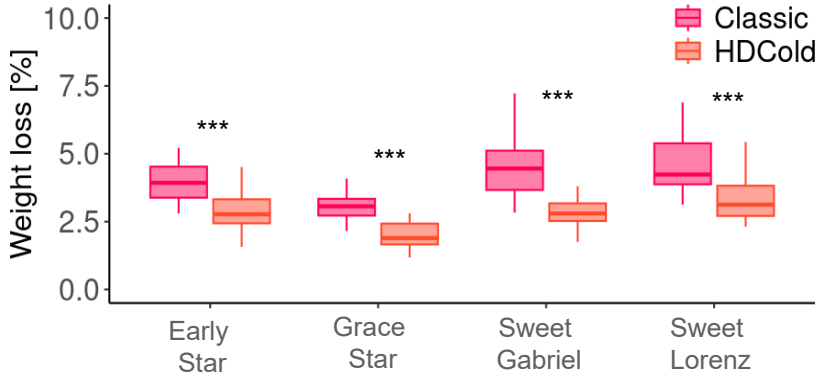
For all tested cherries and apricots cultivars, weight losses were reduced by 32 to 37 % with HDCold®

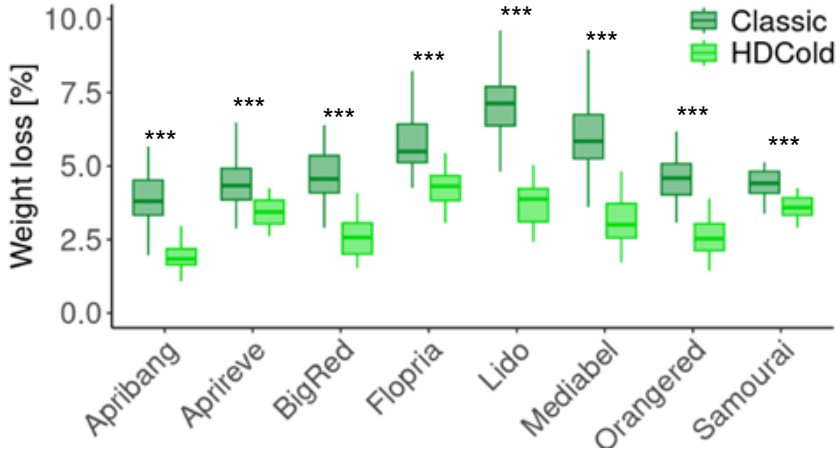
	Average weight loss [%]
Classic	4.1[a]
HDCold®	2.8[b]

-32 %

	Average weight loss [%]
Classic	5.1[a]
HDCold®	3.2[b]

-37 %





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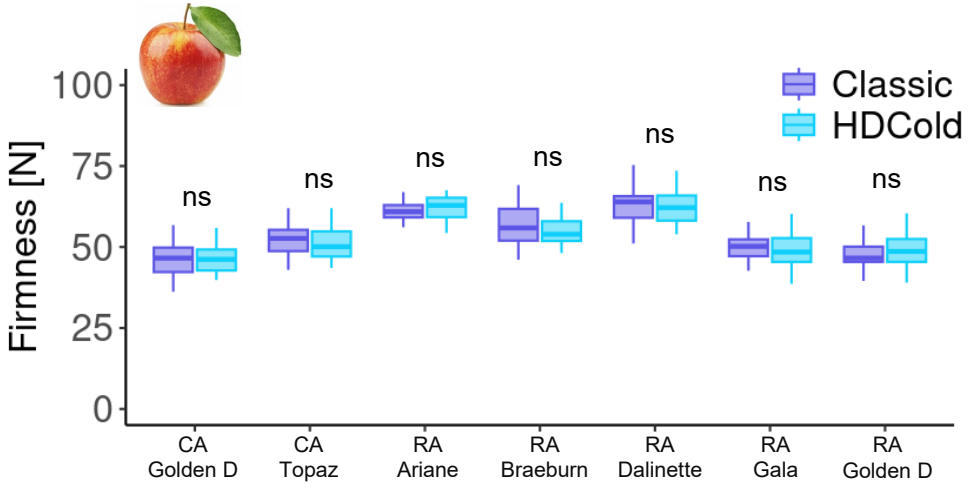
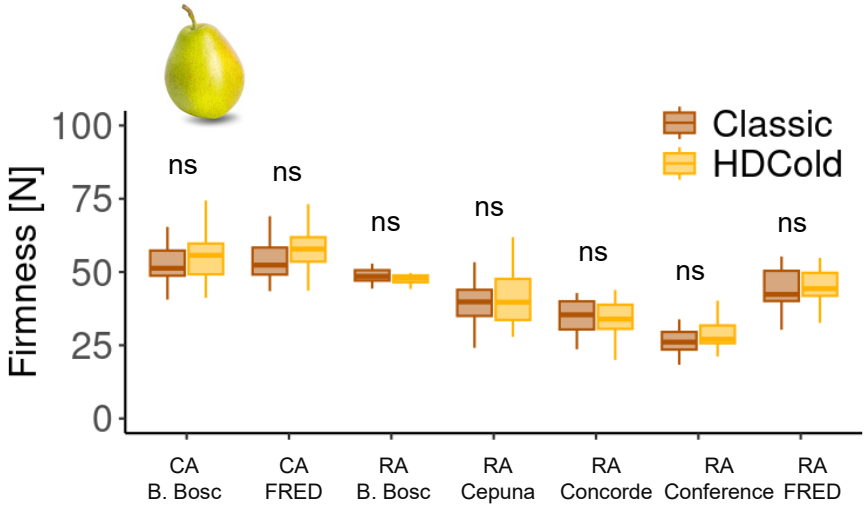
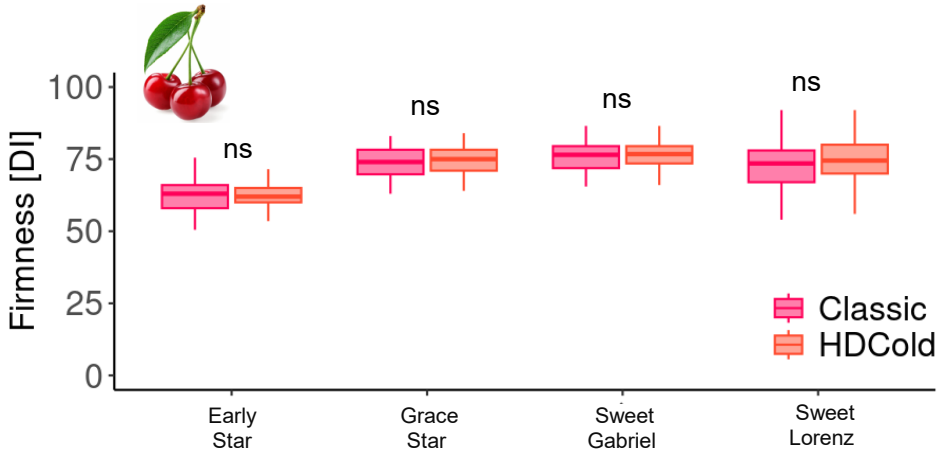
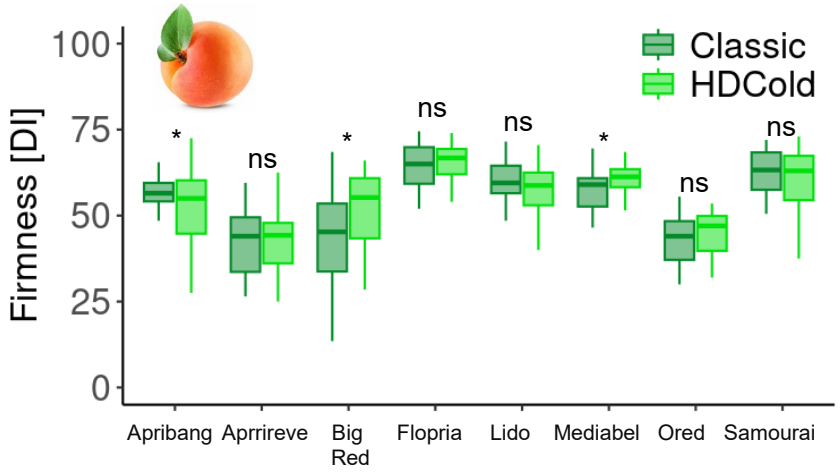
Firmness was not impacted or, for some apricots cultivars, better preserved with HDCold®









*Significant at *: p≤0.05 according to the Student's T-test*
ns: not significant.

On average, color, total soluble solids and acidity were not impacted by HDCold® in most of the trials

	TSS [%Brix]	
	CA	RA
Classic	13.7[a]	13.4[a]
HDCold®	13.1[b]	13.4[a]

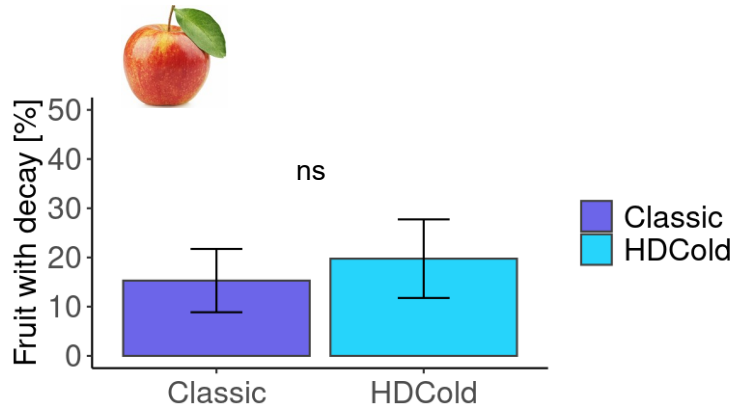
	TSS [%Brix]	
	CA	RA
Classic	12.2[a]	13.3[a]
HDCold®	12.1[a]	13.0[a]

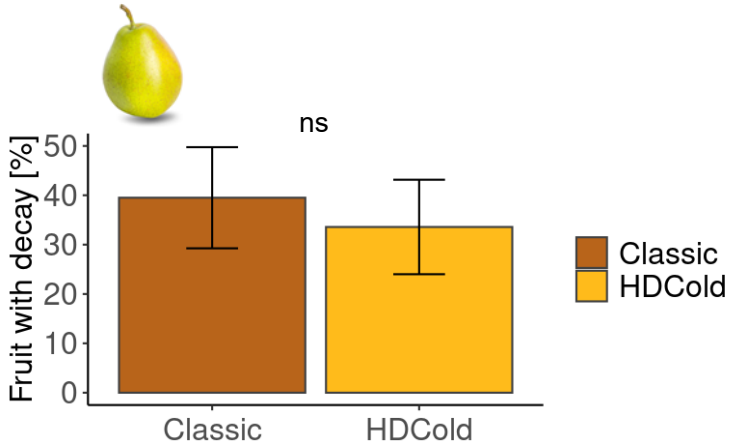
	Color [H°]
Classic	12.1[a]
HDCold®	12.5[a]

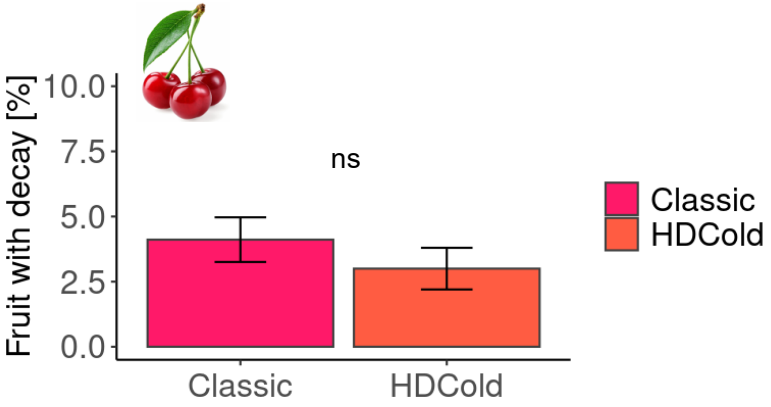
	Color [H°]	TSS [%Brix]	Acidity [g/kg]
Classic	57.8[a]	11.9[a]	12.7[a]
HDCold®	58.2[a]	11.6[a]	12.8[a]

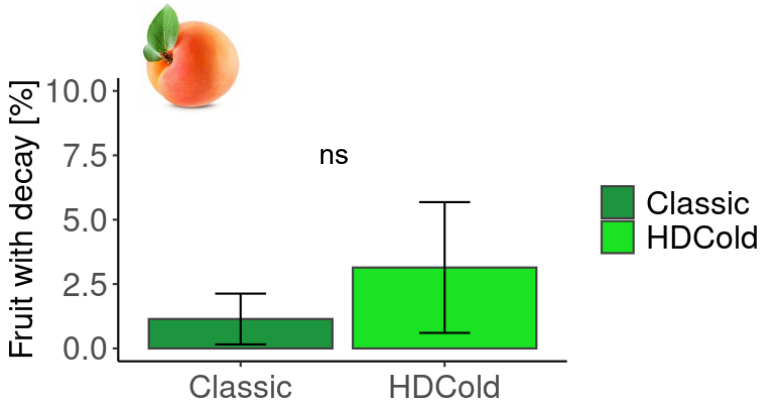
Means with the same letters are not significantly different at p≤0.05 according to the Student's T-test

HDCold® did not impact the development of decay









ns: not significant at p≤0.05 according to the Wilcoxon's test

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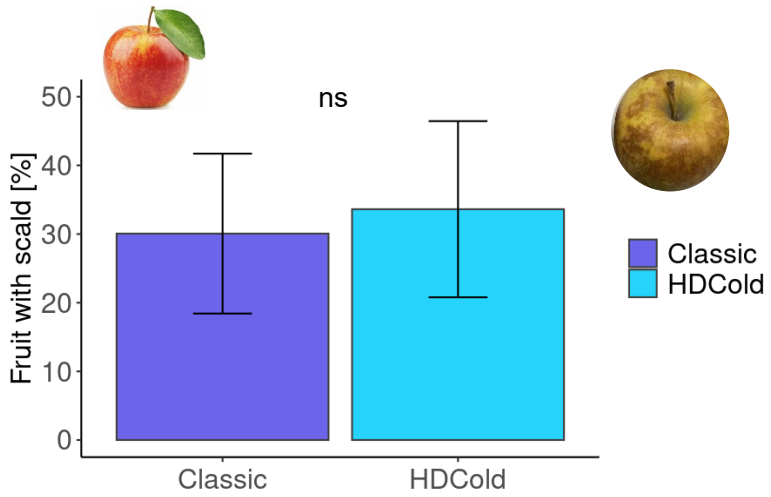
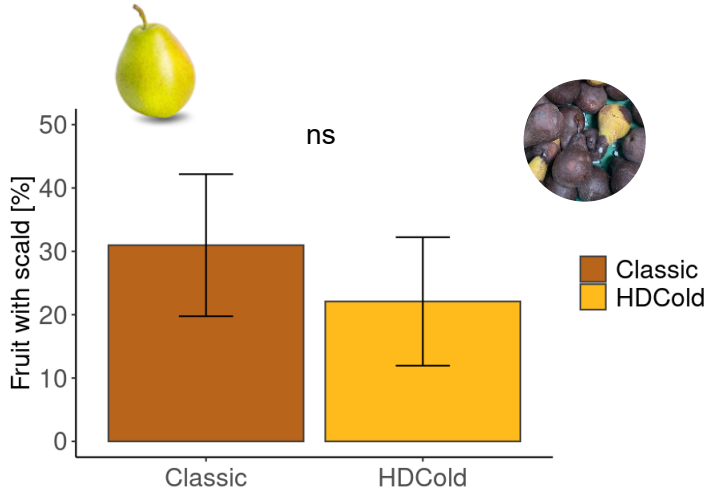
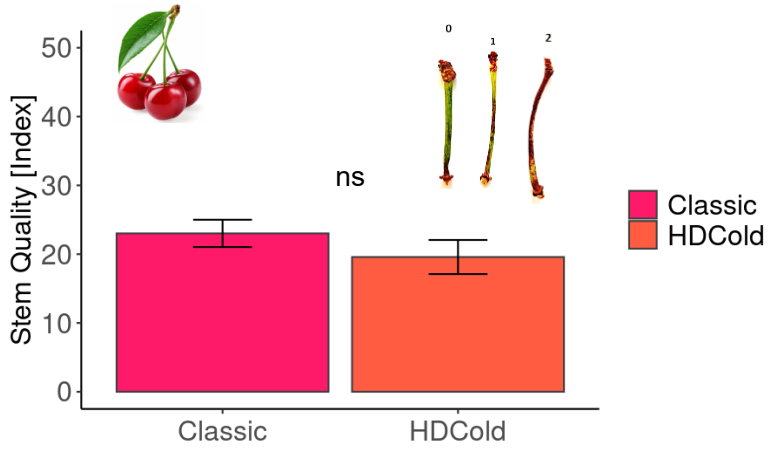
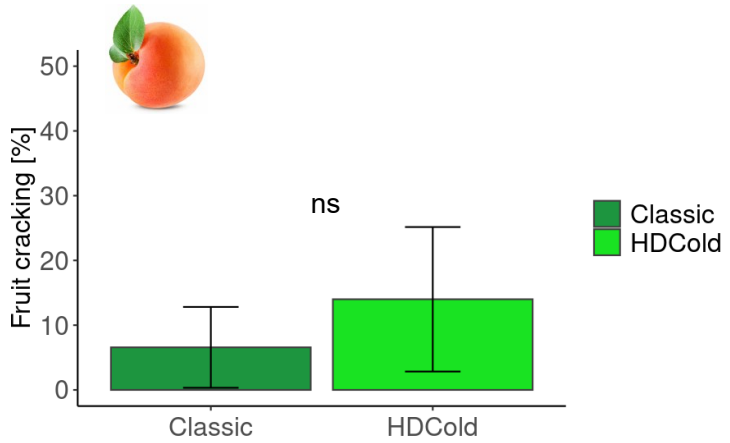
Influence of HDCold® on physiological disorders depends on the type of fruit









ns: not significant at p≤0.05 according to the Wilcoxon's test

Conclusions

- HDCold® air-cooler technology maintained **RH and temperature stable** and **RH at a high level**.
- HDCold® **reduced weight losses** during RA and CA storage without imparing classical quality parameters and fostering development of decay.
- HDCold® tendancially reduced the **scald** on pears but not on apples.
- Quality of **cherries stems** was not strongly improved by HDCold®.
- **Apricot cracking** may be increased with HDCold® for susceptible cultivars.
















Thank you for your attention

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