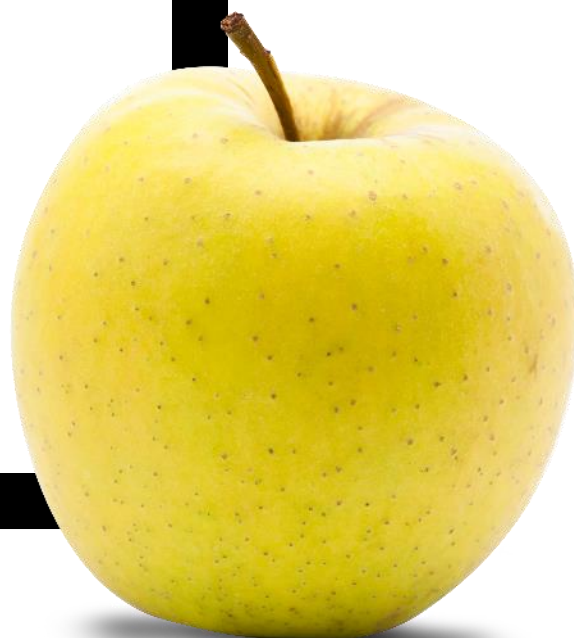


Apple

Golden
Delicious

2020



AIM OF THE STUDY:

DOES THE USE OF THE HDCOLD® TECHNOLOGY IMPROVE THE STORAGE QUALITY OF GOLDEN DELICIOUS APPLES COMPARED TO A STANDARD COLD ROOM?

Current practice^{1,2}:

- Recommended maturity at harvest:
 - Starch: 5–6 (CTIFL chart)
 - Flesh firmness: 7–8 kg/cm²
 - Background colour: C3-C4
- Normal atmosphere (5 months):
0–1°C at 92–94% RH
- Storage in controlled atmosphere (8 months):
2–3% O₂ / 2–3% CO₂ (1.5% in ULO)
- Susceptible to wilting and senescence scald.

HDCold® technology:

- Cold system which maintain natural relative humidity at high levels (>98%)
 - No addition of liquid water
 - Decrease of water loss, and therefore weight loss of the products
- Low temperature difference between the set point and the refrigerant:
 - Less hydric stress on the products
 - Less to no frost formation

¹ Westeramp P., 2023. Conditions de stockage des différentes variétés de pommes. <https://www.ctifl.fr/conditions-de-stockage-des-differentes-varietes-de-pommes>

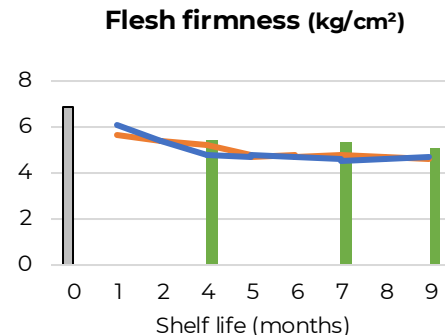
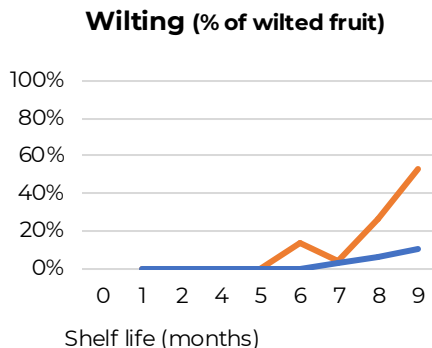
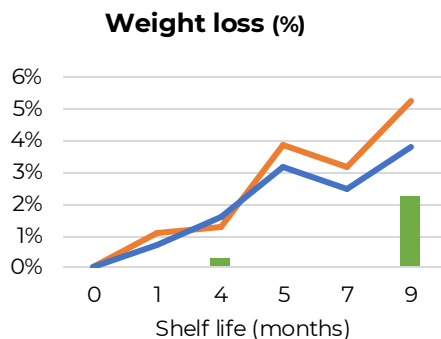
² Gabioud Rebeaud S., Bühlmann A., 2024. Recommandations d'entreposage pour les fruits en 2024. Agroscope Fiche Technique n°222



RESULTS

Harvest: 21 August 2020 (South-West, France) **Starch:** 7.5 (overripe)

Non-HDCold® (1°C) **HDCold®** (1°C, 98% RH) **HDCold® + ULO** (0.8% < O₂ < 1.2%; CO₂ < 1.2%)



After 7 months of storage

March 2021	# out of 30 apples		°Brix (sugars)	Acidity (g/L malic)
	Physiological disorders	Fungal disorders		
Non-HDCold®	6	3	13.1	1.3
HDCold®	3	4	12.8	1.5
HDCold® + ULO	0	0	13.1	2.5

Non-HDCold®



HDCold®



HDCold® + ULO



CONCLUSIONS

Based on these results, the **HDCold® technology** has enabled **better preservation of fruit:**

✓ **Reduction in weight loss during storage**

- ✓ Standard cold room: 3.1% after 7 months of storage
- ✓ HDCold® cold room: 2.5% after 6 months of storage

✓ **Senescence delayed by 2 months**

- ✓ Appearance of scald marks from 5 months in standard cold room, compared to 7 months in HDCold®

✓ **Significantly reduced wilting**

Furthermore, the use of **ULO controlled atmosphere** contributed to **greater firmness** (> 5 kg/cm² even after 9 months), as well as a **slower change in background colour** and the **maintenance of acidity** and **sanitary quality**.



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