

Apple

Granny Smith

2020



AIM OF THE STUDY:

DOES THE HDCOLD[®] TECHNOLOGY IMPROVE THE STORAGE QUALITY OF GRANNY SMITH APPLES COMPARED TO A STANDARD COLD ROOM?

Current practice^{1,2}:

- Recommended maturity at harvest:
 - Starch: 4–5 (CTIFL chart)
 - Flesh firmness: 7.5–8.5 kg/cm²
- Cold storage (5 months):
0–1°C / 90–92% RH
- Controlled atmosphere (> 6–7 months):
2–3% O₂ / 1.5–2% CO₂ (ULO: 1.5%)
- High susceptibility to premature browning, generally prevented by post-harvest 1-MCP treatment

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. 3 p.

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

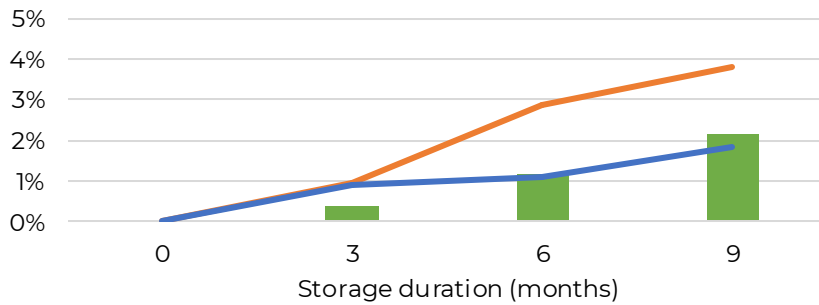
RESULTS

Harvest: 25 Sept. 2020 (South-West, France)

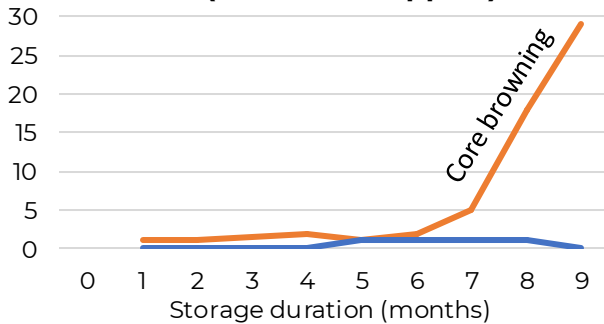
Starch: 5.6 (slightly overripe)

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

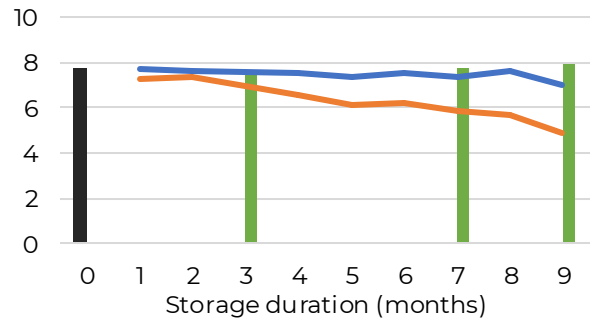
Weight loss (%)



Internal defects (# out of 30 apples)



Flesh firmness (kg/cm²)



After 9 months of storage	# out of 30 apples		°Brix (sugars)	Acidity (g/L malic)
	Physiological disorders	Fungal disorders		
Non-HDCold®	28	0	9.7	4.4
HDCold®	7	0	11.2	5.3
HDCold® + AC	2	0	11.6	6.2

CONCLUSIONS

The HDCold® technology has had the following effects on preservation:

✓ **Reduction in weight loss**

- After 6 months: 1.1% vs. 2.8% with a standard cold room

✓ **Significantly slower loss of firmness**

- Firmness > 6.5 kg/cm², even after 9 months of storage
- With standard cold room, this value is reached after 3 months and decreases during storage

✓ **Delayed senescence**

- Internal defects from 8 months in conventional cold storage vs. none in HDCold®



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