Summary

- ✓ Packaging potato tubers in microperforated film can enhance the shelf life period. The experimental data with the Perfotec system, comprising of a Perfotec Fast Respiration Meter, AMAP website and Perfotec laser with automatic OTR control, did show this.
- ✓ Optimal oxygen concentration for storage of packed Ballerina tubers at ambient temperatures (± 18 °C) to prevent sprouting is 7-9% O_2. The shelf life was doubled from 7 to 14 days.
- ✓ Optimal oxygen concentration for storage of packed Cream Delight tubers at 18 °C to prevent greening is 3 to 5% O_2. The shelf life of freshly harvested tubers was extended from 9 to 11 days.
- ✓ Per potato variety optimal O_2 and CO_2 conditions vary.
- ✓ Because of the large variations year round, from variety to variety regular measurement of respiration rate is required to optimally laser perforate the film.
- ✓ The potential of the Perfotec system on shelf life improvement of potato tubers has been proved.

Want to know more?

If you are interested into more details like the list of references please feel free to contact us at amap@top-bv.nl
More information on the technology can be found at: www.topwiki.nl

Top bv
Agro Business Park 10
6708PW Wageningen,
The Netherlands
Phone +31 317 466270
info@top-bv.nl | www.top-bv.nl

Potato tubers

Perfotec empirical evidence

Literature data of unpeeled potatoes, optimal storage conditions and empirical evidence of the Perfotec system (Fast Respiration Meter, AMAP website and Perfotec laser with automatic OTR control)

Literature

Shelf life of potato tubers

The shelf life of packed potato tubers is being determined by sprouting and when exposed to light by greening due to chlorophyll biosynthesis. This enzymatic reaction is highly temperature dependent. At room temperature it goes faster than at 7 °C. Associated with greening is the formation of alkaloids, a bitter compound that can cause allergic reactions and illness [1]. Higher CO_2 concentrations (above 15%) and 2 to 5% O_2 reduce greening but can have a negative effect on color after cooking (increased sugars) and texture [2, 6, 8, 9]. Storage at temperatures between 5 and 10 °C in the dark is optimal for a long shelf life [3, 4].

Early crop potatoes have a shelf life period of 10-14 days, late crop 5 to 10 months [7]. Up to date scientific data on long term CA storage show no or little beneficial effect [7]. Very little scientific data are available on beneficial CA or MAP conditions for potatoes. In 2006 a positive effect of the unpacked storage of *Cleopatra* at 8 °C, 12 % O_2 and 2% CO_2 was reported. After 28 days potato tubers stored at 8 ° or 18 °C were less marketable but their total sugar content was lower compared to the CA samples [8]. A study published in 2013 showed that *Marfona* tubers could best be stored in an atmosphere of 6% O_2 and 6% CO_2 at 1 °C [9].

Respiration rate

Respiration rates of potato tubers increase during long term storage, differ per variety, maturity stage during harvest, growing conditions, curing conditions, storage temperature and relative humidity (RH), and are being influenced by the use of salts, sprout inhibitors and ethylene [5, 6]. The efficacy of sprout inhibitors is independent of the respiration rate change [6]. Reported respiration rates of different cultivars and sources are depicted in the table.

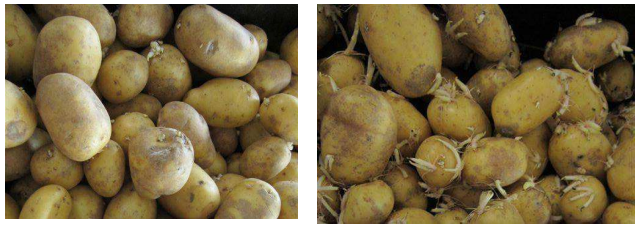
Cultivar, origin	RR(C) O_2 value in ml air/kg.24 hr	T [°C]	Reference
Snowden, USA	950 – 2600	12	5
Monona, USA	300 – 1600	12	5
Novachip, USA	600 - 1900	12	5
Annabelle, UK	250 – 500	10	10
Jersey, UK	700 - 1500	10	11
Maris Peer, UK	600 - 1600	10	12
Ballerina, Netherlands	850 - 1200	19	13
Cream Delight, Australia	600-800	19	14

Experimental data

Experimental set-up

- ✓ *Ballerina* 2,5kg and *Cream Delight* 1 kg; ambient storage (±18 °C)
- ✓ *Ballerina*: microperforated film with target O_2 levels of 4 – 7% versus current macroperforated film.
- ✓ *Cream Delight*: microperforated film with target O_2 levels of 4 - 15% versus current macroperforated film.

Ballerina: Perfotec system microperforated versus macroperforated 14 days after packing



Cream Delight: Perfotec system microperforated versus macroperforated 11 days after packing