

COLD STORABILITY OF PROCESSING POTATOES

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Introduction

Special strategies are necessary to store large amounts of potatoes in such qualities, which allow the production of high quality products also after long term storage in spring or summer time. With regard to cold sweetening, most of those potatoes are stored under elevated temperatures (8-10°C) to prevent an excessive sugar accumulation. Thereby, the time interval until dormancy break is significantly reduced in comparison with a cold storage and as a result anti-sprouting chemicals are needed. The most popular among them is chloropropham (CIPC, chloro-isopropyl N-phenyl carbamate). With respect to CIPC residues and a never ending debate about acceptance of consumers and licence of authorities, efforts were undertaken to develop new cultivars without any cold sweetening. Contrary to GMO developments with enzyme blockade on a molecular level [Sowokinos, 2001; Sowokinos, 2002], German potato breeders used conventional breeding techniques to search for correlation outliers [Putz, 1997].

Since a couple of years, the Federal Office of Plant Varieties has included a special testing for so called "4°C-cultivars" in the official test programme: Samples are stored at 8° and 4°C for about six months, analyzed according to sugar concentration, and processed to both crisps and French fries on a semi-technical processing line of the MRI in Detmold. Next to the test samples, also an assortment of well accepted cultivars is treated in the same manner to get benchmark data. To give a summary of the individual results of the last decade, single data were compiled to indicate any trends of the breeding progress.

Results

Measured values of the survey are pointing out a high variability of individual data, both for reducing sugar content and quality scores of products. The reference samples had at least a variance of values comparable with that of breeding lines, but the range of values was smaller at the references (Table 1 to 3).

Tab. 1: Quality parameters of reference cultivars; average and min/max values of the period between 1998 and 2006.

Sampling time	Dry matter content (%)			Reducing sugars (mg/100 g FW)			Crisps score (1 – 10)			French fries score (1 – 9)		
	average	min	max	average	min	max	average	min	max	average	min	max
Harvest	25.8	24.3	28.4	61.4	23.8	108	7.91	5.33	9.33	6.63	6.28	6.85
Storage	26.8	25.7	30.3	77.7	35.5	152	6.87	4.83	7.88	6.07	5.36	6.81
Cold Storage	26.4	25.3	29.6	200	75.2	437	5.58	4.33	7.28	5.05	4.34	5.98

Tab. 2: Quality parameters of crisping cultivars; average and min/max values of the period between 1998 and 2006.

Sampling time	Dry matter content (%)			Reducing sugars (mg/100 g FW)			Crisps score (1 – 10)		
	average	min	max	average	min	max	average	min	max
Harvest	26.0	24.2	28.5	42.8	29.5	75.3	7.75	5.54	9.33
Storage	27.1	25.5	29.8	76.9	20.3	209	6.48	3.92	9.17
Cold Storage	27.0	25.1	29.3	177	57.9	467	5.23	1.75	8.17

Tab. 3: Quality parameter of chipping cultivars (French fries); average and min/max values of the period between 1998 and 2006.

Sampling time	Dry matter content (%)			Reducing sugars (mg/100 g FW)			French fries score (1 – 9)		
	average	min	max	average	min	max	average	min	max
Harvest	23.5	21.8	23.9	51.2	37.8	61.6	7.25	6.91	7.56
Storage	24.3	22.1	24.9	54.5	27.0	118	6.41	5.93	7.50
Cold Storage	23.7	22.5	24.1	162	72.8	251	5.68	5.04	6.67

Figure 1 indicates the quality of new cultivars, suitable for cold stores in relation to the references. Since 1998 a total number of 4 cultivars entered the National list of potato cultivars, which have a suitability for cold storage. With respect to the relatively low validity of sugar analyses in relation to crisps colour, Figure 1 presents colour values (lightness) in relation to the data of the references. A lower value means a worse quality profile in comparison with the references.

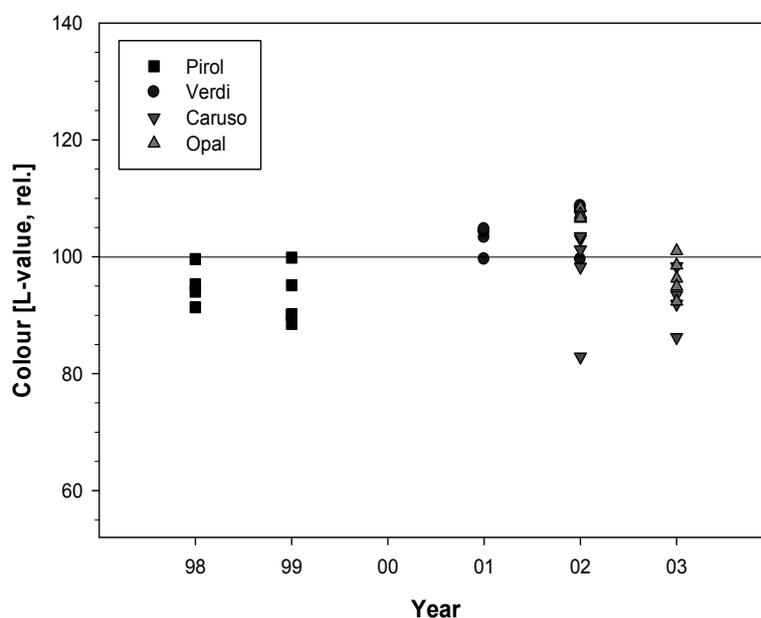


Fig. 1: Crisps colour of new cultivars, suitable for cold store, after a six months storage at +4° C, compared with reference values (= 100%).

Conclusion

Cold storability of cultivars is suitable for processing as an important breeding target. First results of a conventional breeding programme demonstrate the principal realization. The industry is now invited to test these cultivars.

References

- Putz, B. (1997): Erste 4° C-Typen bei Kartoffeln aus deutscher Züchtung. Kartoffelbau 48, 280-283.
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