

# The investigation of suitability to various purposes of industrial processing in stone fruit varieties and variety candidates

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**Summary:** In the laboratory of Conserve-technology in the Research Institute for Fruit Growing, Company of Public Utility, Cegléd, 6 sour cherry, 6 apricot, 5 peach and nectarine, 6 plum and 4 Japanese plum varieties (canned fruit, juice, dried fruit, deep frozen). The products were evaluated by organoleptic methods on a scale of 1–5 steps. The varieties receiving at least 4 points were listed (in brackets also the respective product was indicated): ‘Kántorjánosi’ sour cherry (for all the three purposes), ‘D’ variety candidate (canned and deep frozen), ‘T’ var. cand., (canned, deep frozen), ‘Érdi bőtermő’ (dried fruit), ‘R’ var. cand. (deep frozen); ‘Ceglédi arany’, ‘Ceglédi biborkajszi’, ‘Magyar kajszi’ ‘C. 235’ (fibrous juice); ‘Babygold 5’, ‘Redhaven’ peaches, and ‘Caldesi 2000’ nectarine (canned); ‘Stanley’ plum (canned), ‘Besztercei Bt, 2’ (deep frozen).

**Key words:** stone fruits, canned fruits, fibrous juice, deep freezing, dried fruit, organoleptic rating

## Introduction

About 25–30% of the fruit volume grown in Hungary is stone fruit being consumed also as products processed in various ways. Climatic and soil conditions of Hungary are favourable to develop especially delicate tastes and flavours. Our objective to examine the value of current varieties from the point of view of their suitability for the purpose of industrial processing seemed to be an actual task.

Szabó et al. (1940) claimed: „Canned fruits are eligible to represent best the respective fruit species in the off season regarding their form, colour and flavour...” In producing canned fruit, we have to consider two main principles: a) the product ought to contain the most essential constituents of the fresh fruit (vitamins, tastes, flavours, etc.), b) the appearance of the bottled commodity should be attractive (Bognár et al., 1975). Kott (1965) stated in his study dealing with canned peach, apricot and sweet cherry varieties that the phase of maturity of the fruit is at least as important as its inherited character. Kerek & Fazekas (1974) and Kerek (1976) used for their canning experiments fruit samples of peaches and plums with various stage of maturity and evaluated the products by organoleptic tests. Szabó et al. (1953) mentioned in their textbook on horticultural technology the sour cherry only as being suitable for manufacturing juice. After a half century, this opinion changed a lot, fruit juices are offered made from apricot, peach and plum too (but not from Japanese plum). Dobray (1988) already published recipes to manufacture home made

fibrous apricot and peach juice. It is generally recognised that the vitamin content of the fresh fruit is best maintained by deep freezing. In Hungary, the freezing technology of fruits enjoys high popularity. Beke et al. (2002) frozen products called “mirelit” commodities are prepared using stoned and whole sour cherry and plum varieties. In the case of peeled apricot and peach as well as of plum, a conservation of the colour is necessary depending on the state of maturity and the requirements of the market. After thawing, enzymatic browning ensues in some apricot varieties (Gajzágó et al., 1986). Dehydration of fruits is one of the most ancient methods of preservation, then it was made by exposing the fruit to the sun. Szabó et al (1958) wrote: „As dried fruits, prunes were the most esteemed and most voluminous products.”, apricots are less used in Hungary for dehydration. As a third dried fruit, sour cherry was mentioned and the method described. „For a good quality of dried fruit, suitable varieties are required as the sour cherries ‘Aratómeggy’ and for prunes ‘Besztercei’ and ‘Aszaló szilva’.” (Surányi, 1990).

## Material and method

Six sour cherry varieties were chosen (‘Érdi bőtermő’, variety candidates ‘D’, ‘R’, ‘T’, ‘Kántorjánosi’, ‘Újfehértói fűrtös’), furthermore six apricots (‘Bergeron’, ‘Ceglédi arany’, ‘Ceglédi biborkajszi’, ‘Magyar kajszi C.235’, ‘Tom Cot’, ‘Toyiba’), five peaches/nectarines (‘Babygold 5’, ‘Caldesi 2000’, ‘Fantasia’, ‘Redhaven’, ‘Suncrest’), six



European plums ('Besztercei Bt. 2', 'Bluefre', 'Eačanska lepotica', 'President', 'Révfülöpi szilva', 'Stanley'), four Japanese plums ('Angeleno', 'Black King', 'Giant Super', 'TC Sun'). The fruit samples were collected from different sites: Agárd, Balatonvilágos, Boldogkőváralja, Cegléd, Derecske, Gönc, Nagykőrös, Siófok, Sósút, Szatymaz, Újfehértó.

The processed products belonged to the following commodities and species:

1. **Canned fruit:** sour cherry, apricot, peach, plum,
2. **Fibrous juice:** sour cherry, apricot, peach, Japanese plum,
3. **Deep frozen commodity:** sour cherry, apricot, plum,
4. **Dried fruit:** sour cherry, prune.

The products were prepared according to methods used in the processing industry with the same standards of quality.

First the phase of processing was for all technologies the selection of uniform and entire fruits, which were washed in copious water of drinking quality.

The special treatments were applied to the type of the product:

*Canned fruit:* preparation (depending on the species: removing the stem, peeling, stoning, i.e. removing the stone, halving), filling into the glasses, preparation of the carrying liquid ( $20 \pm 2\%$  sugar solution) and adding it to the fruit, closing, heat treatment, cooling, sticking of the etiquette, storing.

*Fibrous juice:* preparation (depending on the species removing the stem and the stone), squashing of the pulp, filling into bottles, closing, heat treatment, cooling, sticking of the etiquette, storing. The same pulp is used to produce a drink (with 13% sugar content).

*Deep frozen fruit:* (For that purpose, the fruit is taken immediately from the cold storage in order to save energy). Preparation (depending on the species removing the stem, halving, stoning), drying (the freezing box ought to be switched on earlier about one hour before the process of deep freezing started), the fruit is loaded into the deep freezing box ( $-24, -25^\circ\text{C}$ ) on trays in a single layer for 24 hours, then the frozen fruit is packed into plastic bags with appropriate etiquettes, and stored at  $-18^\circ\text{C}$  in cooled boxes.

*Dried fruit:* preparation (removing the fruit stem), elimination of humidity and spreading on the trays in a single layer, putting into the exsiccator. Dehydration is performed at  $70^\circ\text{C}$  by an electric „Memmert” type construction, which is equipped with a fan to remove the humid air.

The experimental products were manufactured in the laboratory of the Research Institute of Fruit Growing, Co. of Public Utility, Cegléd. The organoleptic tests were also organised at the same place.

The following properties have been rated, depending on the type of the product: attractiveness in the glass or appearance, colour, shape and size, consistency, taste, flavour.

The deep frozen fruit ought to be prepared to human consumption, i.e. first thawing up, or treating in a microwave heater. The time needed depends on the size of the

fruits: for sour cherry 1 to 1.60 minute, for apricot 2 to 2.50, for plum 2.15 to 3.50 minutes.

All characters were rated on a scale of 1–5 points. The sum of points given for four or five characters may attain ( $4 \times 5$ ) 20 or ( $5 \times 5$ ) 25 points as a maximum, respectively. The individual ratings and the sum of the jury members were registered. The data were processed computing the means and coefficients of variation (CV). The latter expresses the stability of the respective character and the tendency of agreement among the jury members.

The value of CV may mean, according to J. Manzel, stability ( $<10\%$ ), moderate variability (10–20%), high variability (20.1–30%) and excessive variability ( $>30\%$ ).

Every type of processed fruit was presented to the jury in two alternatives (“a” and “b”)

#### Canned fruit

Species	Variant to be rated	
	a	b
sour cherry	heat treatment at $92-93^\circ\text{C}$	at $80^\circ\text{C}$
apricot		+ 1% K-sorbate added
plum		
peach	heat treatment at $92-93^\circ\text{C}$	
nectarine		concentration adjusted in the juice by means of sugar
		sweetening agent

#### Fibrous fruit juice

Species	Variant to be rated	
	a	b
sour cherry, apricot as primary substance	pulp only	pulp + 1% stone remnants
peach		concentration adjusted in the fruit juice by means of
Japanese plum	sugar	sweetening agent

#### Deep frozen fruit

Species	Variant to be rated	
	a	b
sour cherry	frozen in original form	soaking in 30% sugar solution before freezing for 30 minutes
plum		
apricot	the halved pieces are immediately dipped into a colour saving solution	soaking in 30% sugar solution containing also colour saving substance for 60 minutes

Composition of the colour saving solution: ascorbic acid (0.2%)+ Na Cl (0.15%)



## 50 Dried fruit

Species	Variant to be rated	
	a	b
sour cherry	dried in natural form	dried after being soaked in 30% sugar solution for 30 minutes
plum	dried in natural form	cooking before being dried for 10 minutes

## Results

## Evaluation of the canned fruits

Five characters were evaluated: 1. attractiveness in the glass or appearance, 2. colour, 3. shape and size, 4. consistency, 5. taste, flavour. Thus the sum of point was 25 as a maximum. We claimed that the actual requirements for quality could be met with a minimum of 4 points for each character. Only the category of the size (number 3) was allowed to be skipped, because also varieties of small fruits may offer high quality as canned fruit.

The canned products made from sour cherry, apricot and plum are evaluated (Tables 1, 2, 3) and it was stated that among the species the sour cherry was most successful without considering the two alternatives of processing. The varieties were attractive, well coloured and – with the exception of ‘Újfehértói fűrtös’ – of adequate. The firmness lost some from its quality in ‘Érdi bőtermő’ as an effect of the heat treatment at 92°C. Unfortunately, the important qualities of taste and flavour were maintained in the two (“a” and “b”) variants of the variety candidates ‘T’ and ‘D’ only, and in the “a” variant of ‘Kántorjánosi’. With the exception of ‘Újfehértói fűrtös’ variant „b”, every variety received more than 20 points, which mean that the mean of characters received 4 points. The parameter CV indicated stability (except 2 proved to be intermediately variable).

Apricot varieties, similarly to sour cherries, received favourable rating regarding appearance and colour. ‘Toyiba’, ‘Ceglédi arany’ in both variants, ‘Ceglédi biborkajszi’ in the „b” variant, displayed smaller fruit than the rest of varieties. The consistency of the canned commodity was intermediate in both variants, but ‘Magyar kajszi C. 235’ fruits suffered from the heat treatment at 92°C. ‘Bergeron’, ‘Tom Cot’ and ‘Toyiba’ tasted well, whereas ‘Ceglédi arany’, ‘Ceglédi biborkajszi’, ‘Magyar kajszi C. 235’ produced less attractive taste in 2005 – contradicting earlier findings. The sum of points produced more than the mean of 4 for per character, in ‘Bergeron’, ‘Tom Cot’, ‘Toyiba’ (in both variants) and ‘Magyar kajszi C. 235’ in the „b” variant. The CV values proved stability in 2/3 of samples and moderate variability in 1/3 of samples.

Plum varieties received almost in all samples the 4 points regarding the form and size, however, the judgment of

Table 1. Evaluation of canned sour cherries  
Cegléd, November 9, 2005

Variety	Process- ing variant (a and b)	Characters to be rated						
		Appe- arance- in glass (1–5)	Colour (1–5)	Shape, & size (1–5)	Consis- tency (1–5)	Taste & flavour (1–5)	Total (maxi- mum 25 points)	
T variety candidate	a	mean cv	4.7 14.3	4.5 11.1	4.9 4.6	4.8 9.3	5.0 0.0	23.9 4.8
	b	mean cv	4.4 12.5	4.8 9.3	4.6 11.9	4.8 9.3	4.9 4.6	23.5 5.2
D variety candidate	b	mean cv	4.4 20.3	4.4 20.3	4.7 9.5	4.5 11.1	4.1 18.1	22.1 9.1
Kántorjánosi	a	mean cv	4.5 11.1	4.5 11.1	4.4 20.3	4.2 19.9	4.3 10.4	21.9 9.2
	b	mean cv	4.4 20.3	4.6 11.9	4.5 11.1	4.2 19.9	3.9 22.9	21.6 7.6
D variety candidate	a	mean cv	4.6 11.9	4.3 19.5	4.2 10.7	4.3 15.6	4.1 18.1	21.5 11.0
R variety candidate	b	mean cv	4.7 9.5	4.0 17.7	4.7 9.5	4.3 19.5	3.8 22.0	21.5 9.6
Érdi bőtermő	a	mean cv	4.4 12.5	4.6 11.9	4.6 11.9	3.8 11.8	3.9 22.9	21.3 2.1
	b	mean cv	4.2 10.7	4.2 19.9	4.8 9.3	4.4 9.5	3.5 20.2	21.1 7.9
R variety candidate	a	mean cv	4.1 21.8	4.5 11.1	4.4 20.3	4.2 19.9	3.7 18.1	20.9 11.8
Újfehértói fűrtös	a	mean cv	4.7 9.5	4.6 11.9	3.4 16.1	4.2 10.7	3.6 15.2	20. 7.3
	b	mean cv	4.5 11.1	4.4 12.5	3.6 15.2	4.0 0.0	3.3 13.6	19.8 6.6

appearance in the glass bottles was not as uniform as of apricot and sour cherry varieties. Out of varieties ‘Besztercei Bt. 2’, ‘Bluefre’, ‘Čačanska leptica 1–1’ and ‘President’, altogether 3 samples only received less than 4 points. The lower temperature applied in the heat treatment was favourable for the consistency of the canned fruit, but only in ‘Čačanska leptica’ was it rated as a better quality. ‘Stanley’ had a good consistency regardless of the heat treatment. Favourable judgment of taste was given to ‘Besztercei Bt. 2’ for both treatments and to ‘Čačanska leptica’, ‘Stanley’ and ‘President’ for the „a” variant only. Summing up the points, more than 20 points were given to ‘Stanley’ for both variants and to ‘Čačanska leptica’ and ‘Besztercei Bt. 2’ for the „b” variant. The CV values over the majority of samples suggest essentially stability, in two samples moderate variability only.

Among the peach and nectarine varieties (Table 4) ‘Babygold 5’, ‘Caldesi 2000’, ‘Redhaven’ all canned products made with sugar received good rating, but with sweetening agent, taste and flavour were inferior. ‘Suncrest’ owed its maximum (20) points to the fruit size. In 90% of the samples this trait proved to be stable.



**Table 2.** Evaluation of canned apricots  
Cegléd, November 9, 2005

Variety	Processing variant (a and b)		Characters to be rated					Total (maximum 25 points)
			Appearance in glass (1-5)	Colour (1-5)	Shape, & size (1-5)	Consistency (1-5)	Taste & flavour (1-5)	
Bergeron	b	mean.	5.0	5.0	4.8	3.4	4.4	22.6
		cv	0.0	0.0	9.3	16.1	9.5	4.8
Tom Cot	a	mean.	4.5	4.9	5.0	3.3	4.5	22.2
		cv	11.1	4.6	0.0	25.4	11.1	2.6
Bergeron	a	mean.	5.0	5.0	4.8	3.0	4.3	22.1
		cv	0.0	0.0	9.3	23.6	19.5	3.4
Tom Cot	b	mean.	4.9	4.0	4.8	3.5	4.4	21.6
		cv	4.9	4.0	4.8	3.5	4.4	3.0
Toyiba	b	mean.	4.6	4.7	3.8	3.3	4.7	21.1
		cv	11.9	9.5	20.0	25.4	9.5	7.7
Magyar kajszi C. 235	b	mean.	4.1	4.7	4.4	3.5	3.6	20.3
		cv	13.4	9.5	20.3	14.3	18.1	11.6
Toyiba	a	mean.	4.3	4.4	3.7	3.5	4.1	20.0
		cv	10.4	20.3	18.1	28.6	18.1	12.4
Magyar kajszi C.235	a	mean.	4.2	4.5	4.8	2.4	3.8	19.7
		cv	10.7	19.3	9.3	37.3	33.0	15.2
Ceglédi biborkajszi	a	mean.	4.8	4.2	4.0	3.4	3.1	19.5
		cv	9.3	6.5	23.4	26.3	28.9	9.
	b	mean.	4.8	4.4	3.8	3.0	2.9	18.9
		cv	9.3	9.5	11.8	23.6	25.6	10.6
Ceglédi arany	a	mean.	4.3	4.4	3.4	3.2	3.6	18.9
		cv	10.4	9.5	19.2	26.2	31.7	7.6
	b	mean.	4.0	4.1	3.4	3.2	3.9	18.6
		cv	0.0	18.1	16.1	26.2	14.0	9.2

### Evaluation of fibrous fruit juices

Characters to be rated: 1. attractiveness of the bottled produce, 2. colour, 3. flavour, 4. taste. The maximum was thus 20 points.

Sour cherry and apricot as well as peach and Japanese plum are processed according to the same technology.

The target set in quality was attained with the variety 'Kántorjánosi meggy' only with the „a” technology (Table 5). The rest of varieties were judged to be insufficient in one or other character to raise the sum of points: 'R' variety candidate, „a” variant in attractive appearance of the glass; 'Újfehértói fürtös' in both variants, appearance and colour; 'Érdi bőtermő' in both variants, flavour and taste; 'D' variety candidate „a” variant, taste. It was generally stated that the „a” variant containing some remnants of the stone were more accepted than variant „b”. An exceptionally esteemed trait of 'Kántorjánosi meggy' was the flavour.

The results obtained with the fibrous fruit juice of apricots is shown in Table 6. 'Magyar kajszi C. 235' received the best rating with the juice containing remnants of the kernel as a source of flavour. 'Bergeron', 'Ceglédi arany' and 'Ceglédi biborkajszi' achieved also good positions as regards

**Table 3.** Evaluation of canned plums  
Cegléd, November 17, 2005

Variety	Processing variant (a and b)		Characters to be rated					Total (maximum 25 points)
			Appearance in glass (1-5)	Colour (1-5)	Shape, & size (1-5)	Consistency (1-5)	Taste & flavour (1-5)	
Stanley	b	mean.	4.6	4.3	4.5	4.2	3.7	21.3
		cv	15.1	14.7	9.6	18.8	27.2	7.2
	a	mean.	4.1	4.2	4.5	4.0	4.2	21.0
		cv	9.1	11.5	11.7	21.1	14.0	6.7
Čačanska lepotica	b	mean.	4.2	4.1	4.2	4.6	3.7	20.8
		cv	8.1	16.9	9.8	10.0	26.7	7.4
Besztecei Bt. 2	b	mean.	4.2	4.4	4.2	3.7	4.3	20.8
		cv	11.5	11.7	15.7	25.9	20.9	6.2
Bluefre	b	mean.	4.1	3.6	4.4	3.5	3.9	19.5
		cv	14.8	14.3	17.1	17.8	20.8	7.7
Révfülöpi szilva	b	mean.	4.4	4.1	4.1	3.4	3.4	19.4
		cv	13.3	22.9	14.8	28.2	21.7	9.6
Bluefre	a	mean.	4.3	4.1	4.4	2.8	3.7	19.3
		cv	14.7	16.1	17.2	24.1	19.3	10.0
Besztecei Bt. 2	a	mean.	3.9	4.1	4.1	2.6	4.3	19.0
		cv	10.1	16.9	12.3	23.6	11.2	5.6
President	a	mean.	4.0	3.5	4.5	2.3	4.0	18.3
		cv	23.5	28.5	11.2	21.0	17.7	13.3
	b	mean.	3.7	3.5	4.6	2.5	3.9	18.2
		cv	21.3	15.1	15.2	22.5	19.4	9.7
Čačanska lepotica	a	mean.	4.2	3.1	4.0	2.7	4.2	18.2
		cv	8.1	28.1	17.7	25.0	17.1	7.2
Révfülöpi szilva	a	mean.	4.6	4.0	3.9	2.1	3.3	17.9
		cv	10.0	16.7	16.3	27.0	13.1	7.4

the sum of points, but the taste of the „a” variant of 'Ceglédi arany' and 'Ceglédi biborkajszi', and the flavour of 'Bergeron', both variants did not achieve 4. Regarding the summed up number of points, the samples with kernel remnants were more attractive – thus contrasting with the sour cherry products.

Peaches and nectarines reached the best rating in the variety 'Redhaven', „a” variant (Table 7). This sample excelled with its appearance and colour, but proved to be inferior in flavour and taste according to the judgment of the jury. The different processing methods and peach or nectarine varieties did not achieve a rating of 4 points. As exceptions are considered 'Babygold 5' variant „a” in taste, „b” in appearance of the glass; 'Redhaven' „b” in appearance in the glass. The sum of points was the less in 'Caldesi 2000' „a” and „b” and in 'Fantasia' variant „b”.

The inferior quality of Japanese plums is expressed in summarised number of points, being the highest 14.7 ('Angeleno' „a” variant). This sample received a good grade for its colour. Higher than 4 point were given to 'Black King' and to 'TC Sun' varieties for their appearance and colour. Because of the sweetening agents all samples were inferior than those containing sugar. The summarised number of points caused therefore the limited differences among the varieties; i.e. a narrow variation between 0.8–2.8 points (Table 8).

**Table 4.** Evaluation of canned peaches  
Cegléd, November 9, 2005

Variety	Processing variant (a and b)	Characters to be rated					
		Appearance in glass (1-5)	Colour (1-5)	Shape & size (1-5)	Consistency (1-5)	Taste & flavour (1-5)	Total (maximum 25 points)
Babygold 5	a	mean. 4.8 cv 7.6	5.0 0.0	4.9 7.2	4.6 9.5	4.2 19.9	23.5 4.7
	b	mean. 5.0 cv 0.0	5.0 0.0	4.7 7.6	4.5 12.5	3.9 23.0	23.1 6.6
Redhaven	a	mean. 4.5 cv 10.3	4.2 17.8	4.3 10.5	4.6 9.5	4.3 15.1	21.9 8.8
	b	mean. 4.7 cv 9.6	4.6 9.5	4.0 18.9	4.4 16.3	3.7 14.1	21.4 4.6
Caldesi 2000	a	mean. 4.0 cv 14.9	4.0 13.4	4.3 10.5	4.7 9.6	4.4 9.4	21.4 6.4
	b	mean. 4.4 cv 12.7	4.3 16.3	4.4 11.2	4.3 10.5	3.5 16.4	20.9 5.2
Suncrest	a	mean. 3.7 cv 14.1	3.6 21.7	4.9 7.2	3.9 17.3	4.3 15.1	20.4 11.0
	b	mean. 3.9 cv 16.6	3.8 13.9	4.6 9.6	4.1 13.8	3.8 17.1	20.2 6.9
Fantasia	a	mean. 4.4 cv 10.1	3.7 12.2	4.4 11.2	3.6 19.0	3.8 19.8	19.9 6.6
	b	mean. 4.1 cv 13.8	3.8 19.8	4.3 10.5	4.0 13.4	3.7 9.6	19.9 8.3

**Table 5.** Evaluation of sour cherry juices  
Cegléd, November 17, 2005

Variety	Processing variant (a and b)	Characters to be rated					Total (maximum 20 points)
		Appearance in glass (1-5)	Colour (1-5)	Flavour (1-5)	Taste (1-5)		
Kántorjánosi	a	mean. 4.0 cv 13.4	4.1 14.0	4.6 9.5	4.2 27.2	16.9 12.1	
	b	mean. 3.9 cv 10.6	4.1 13.8	4.3 8.5	4.3 19.6	16.6 11.0	
Érdi bőtermő	a	mean. 4.8 cv 7.6	4.7 9.6	3.5 17.1	3.4 32.6	16.4 12.1	
	b	mean. 3.9 cv 10.6	3.8 11.4	4.1 15.3	4.3 15.1	16.1 6.6	
Újfehértói fürtös	a	mean. 4.9 cv 7.2	4.6 15.9	3.6 14.1	2.9 40.7	16.0 14.7	
	b	mean. 4.1 cv 13.8	4.1 13.8	4.1 15.4	3.4 19.8	15.7 8.0	
D fajtajelölt	a	mean. 3.9 cv 9.1	4.0 13.8	3.9 10.6	3.9 21.6	15.7 8.3	
	b	mean. 3.7 cv 14.1	3.6 20.4	4.3 19.6	4.1 31.1	15.7 15.8	
Érdi bőtermő	a	mean. 3.9 cv 17.3	3.7 24.8	3.8 21.0	4.1 22.2	15.5 15.6	
	b	mean. 3.8 cv 13.9	3.6 21.7	3.7 12.2	3.8 24.3	14.9 12.7	
T fajtajelölt	a	mean. 3.5 cv 16.4	3.2 21.3	3.6 19.0	4.0 23.2	14.3 14.8	
	b	mean. 3.7 cv 14.1	3.6 21.7	3.4 14.4	3.4 23.5	14.1 12.9	

### The evaluation of deep frozen products

Four characters were checked: 1. colour, 2. shape, size, 3. consistency, 4. taste and flavour, the maximum being 20 as a sum.

Frozen fruit was made in sour cherry and plum using the same technology.

Out of the 6 sour cherry varieties 'Újfehértói fürtös' alone did not achieve a good quality with any processing variant (Table 9). 'Érdi bőtermő' and 'D' variety candidate furnished excellent rough material for the deep freezing technology. The rest of varieties needed improvement in the following characters: 'Kántorjánosi' in colour ('a' variant), 'R' candidate in taste ('b' variant), 'T' candidate in consistency and taste ('a' variant).

Among plums, 'Besztercei Bt. 2' frozen in natural state excelled with the best rating (Table 10). The sample treated with sugar received inferior grades as for its consistency. The next best variety was 'Révfülöpi szilva', which could not achieve 4 points (in any variant) as for its size. 'Èaèanska leptica' and 'Stanley' were inferior in taste (both variants), 'Stanley' also in consistency. 'Bluefre' with its larger fruit was inferior in consistency. The difference found between the two technologies proves the poor sugar content of the rough fruits.

Any of the apricot varieties and technological variants did not produce good quality as frozen fruit (Table 11). 'Tom Cot' received though received good rating in colour, size,

**Table 6.** Evaluation of apricot juices  
Cegléd, November 17, 2005

Variety	Processing variant (a and b)	Characters to be rated					Total (maximum 20 points)
		Appearance in glass (1-5)	Colour (1-5)	Flavour (1-5)	Taste (1-5)		
Magyar kajszi C. 235	b	mean. 5.0 cv 0.0	4.7 8.9	4.5 16.6	4.5 14.8	18.7 8.0	
	a	mean. 5.0 cv 3.2	4.8 7.3	4.2 14.0	4.4 8.3	18.4 3.4	
Ceglédi arany	b	mean. 4.9 cv 4.3	4.8 8.8	4.2 19.6	3.8 29.2	17.7 10.8	
	a	mean. 4.2 cv 8.3	4.3 12.9	4.6 13.2	3.9 27.4	17.0 9.2	
Ceglédi biborkajszi	b	mean. 4.3 cv 12.5	4.2 12.8	4.3 9.0	4.0 22.7	16.8 7.7	
	a	mean. 4.1 cv 10.8	4.2 14.0	3.7 19.1	4.1 12.6	16.1 8.6	
Bergeron	b	mean. 4.2 cv 8.3	4.2 14.0	3.6 18.3	4.0 11.8	16.0 8.8	
	a	mean. 3.9 cv 12.3	3.8 15.4	4.2 19.6	3.1 22.6	15.0 13.1	
Magyar kajszi C. 235	b	mean. 3.3 cv 20.5	3.5 17.4	3.8 27.2	3.6 34.5	14.2 19.4	
	a	mean. 3.8 cv 9.4	3.8 9.2	3.4 28.2	3.2 23.2	14.2 12.4	
Toyiba	b	mean. 3.2 cv 28.1	2.9 24.1	3.6 19.4	3.5 16.5	13.2 17.7	
	a	mean. 2.8 cv 15.1	2.8 20.3	3.5 23.1	3.0 22.2	12.1 14.3	



consistency, but its taste was mediocre. Besides 'Tom Cot', 'Toyiba' "a" and "b" as well as 'Magyar kajszi C. 235' „b" deserved to be mentioned because of their good size and consistency.

#### Evaluation of dried fruits

The characters being evaluated: 1. appearance (attractiveness), 2. shape – size, 3. consistency, 4. taste – flavour. The maximum of complex ratings is 20 point.

Table 7. Evaluation of peach juices  
Cegléd, November 9, 2005

Variety	Characters to be rated					
	Processing variant (a and b)		Appearance in glass (1–5)	Colour (1–5)	Flavour (1–5)	Taste (1–5)
Redhaven	a	mean. 4.6	4.4	3.5	3.6	16.1
		cv 10.7	15.1	15.7	29.8	9.9
Suncrest	a	mean 4.3	3.9	3.7	3.9	15.8
		cv 14.4	26.1	16.5	27.3	17.5
Babygold 5	b	mean 4.3	4.0	3.7	3.4	15.4
		cv 9.8	15.8	16.3	29.9	11.5
Redhaven	b	mean 4.3	3.8	4.0	3.1	15.2
		cv 11.9	20.2	7.9	38.9	12.3
Redhaven	b	mean. 4.2	3.9	3.7	2.9	14.7
		cv 9.8	17.0	14.1	41.2	16.5
Fantasia	a	mean 3.3	3.7	3.8	3.2	14.0
		cv 18.8	23.5	25.7	12.9	15.0
Babygold 5	a	mean 2.7	3.2	3.8	4.0	13.7
		cv 19.4	18.8	23.5	15.8	14.4
Fantasia	b	mean 2.8	3.1	3.2	3.0	12.1
		cv 15.2	31.1	12.9	29.8	12.4
Caldesi 200	a	mean. 2.8	2.7	3.2	3.1	11.8
		cv 34.7	30.6	23.3	36.1	25.7
Caldesi 200	b	mean 2.5	2.7	3.3	3.3	11.8
		cv 21.9	30.6	29.9	38.6	24.7

Table 8. Evaluation of Japanese plum juices  
Cegléd, November 17, 2005

Variety	Characters to be rated					
	Processing variant (a and b)		Appearance in glass (1–5)	Colour (1–5)	Flavour (1–5)	Taste (1–5)
Angeleno	a	mean. 3.7	4.2	3.3	3.5	14.7
		cv 17.1	10.0	35.7	25.2	10.9
TC Sun	a	mean 4.1	4.2	2.7	3.4	14.4
		cv 16.9	14.0	44.7	23.8	17.4
Black King	a	mean 4.1	4.4	2.6	3.3	14.4
		cv 17.9	13.3	36.2	33.4	16.8
Black King	b	mean 4.6	4.6	2.9	1.5	13.6
		cv 22.0	17.2	35.2	53.8	15.5
TC Sun	b	mean. 4.6	4.3	2.5	1.7	13.1
		cv 12.3	16.9	39.7	67.1	17.1
Giant Super	a	mean 3.0	3.1	2.7	3.1	11.
		cv 20.3	18.3	36.7	26.2	15.8
Angeleno	b	mean 3.5	3.6	3.0	1.8	11.9
		cv 18.1	18.3	41.1	60.6	17.9
Giant Super	b	mean 3.0	2.8	2.5	1.6	9.9
		cv 24.6	26.7	41.3	67.2	236.7

Table 9. Evaluation of deep frozen sour cherries  
Cegléd, November 17, 2005

Variety	Characters to be rated					
	Processing variant (a and b)		Colour (1–5)	Shape & size (1–5)	Consistency (1–5)	Taste & flavour (1–5)
Érdi böermő	a	mean. 4.7	4.8	4.2	4.3	18.0
		cv 14.4	7.3	15.1	13.7	8.4
D fajtajelölt	a	mean 4.5	4.7	4.4	4.4	18.0
		cv 11.7	10.2	11.7	14.0	8.5
T fajtajelölt	b	mean 4.7	4.9	4.0	4.1	17.7
		cv 9.0	7.0	16.7	16.1	8.9
D fajtajelölt	b	mean 4.4	4.7	4.3	4.3	17.7
		cv 12.9	9.0	12.7	11.2	4.2
Érdi böermő	b	mean. 4.4	4.5	4.1	4.1	17.1
		cv 12.9	11.2	20.6	19.8	10.7
Kántorjánosi	a	mean 3.9	4.7	4.2	4.2	17.0
		cv 18.4	5.6	17.1	17.0	10.5
Kántorjánosi	b	mean 4.7	4.6	4.2	4.4	17.9
		cv 13.5	12.1	15.1	10.4	9.7
R fajtajelölt	b	mean 4.4	4.5	4.2	3.9	17.0
		cv 15.0	10.5	18.0	22.5	9.7
R fajtajelölt	a	mean. 4.2	4.5	4.2	4.0	16.9
		cv 15.1	9.6	18.8	18.3	11.0
T fajtajelölt	a	mean 4.5	4.7	3.6	3.9	16.7
		cv 14.8	7.3	20.4	16.3	11.1
Újfehértói fűrtös	b	mean. 3.7	3.5	3.3	2.9	13.4
		cv 17.1	12.3	29.6	20.3	15.5
Újfehértói fűrtös	a	mean 3.7	3.4	3.2	2.9	13.2
		cv 21.5	14.4	28.1	21.2	15.1

Table 10. Evaluation of deep frozen plums  
Cegléd, November 9, 2005

Variety	Characters to be rated					
	Processing variant (a and b)		Colour (1–5)	Shape & size (1–5)	Consistency (1–5)	Taste & flavour (1–5)
Besztercei Bt. 2	a	mean. 4.3	4.3	4.6	4.7	17.9
		cv 10.4	22.7	11.9	9.5	8.2
Čačanska leptotica	a	mean 5.0	4.9	4.5	3.2	17.6
		cv 0.0	4.6	11.1	34.2	8.6
Čačanska leptotica	b	mean 4.9	4.7	4.2	3.6	17.4
		cv 4.3	9.5	19.9	18.1	9.6
Révfülöpi szilva	b	mean 4.6	3.6	4.5	4.7	17.4
		cv 11.9	31.7	15.7	9.5	9.8
Révfülöpi szilva	a	mean. 4.4	3.8	4.6	4.5	17.3
		cv 12.5	22.0	9.1	11.1	13.5
Bluefre	b	mean 4.6	4.0	3.6	4.5	16.7
		cv 11.9	19.5	42.3	44.7	17.3
Besztercei Bt. 2	b	mean 4.6	4.0	3.6	4.5	16.7
		cv 11.9	20.4	14.3	15.7	12.6
Stanley	a	mean 4.6	4.3	3.8	3.9	16.6
		cv 11.9	10.4	34.3	16.7	14.7
Stanley	b	mean. 4.5	4.5	3.8	2.8	15.6
		cv 11.1	11.1	34.3	39.1	17.2
Bluefre	a	mean 4.9	4.6	3.4	2.2	15.1
		cv 4.6	9.1	44.6	38.0	12.5
President	a	mean. 3.3	4.5	4.2	2.8	14.8
		cv 13.6	11.1	19.9	16.0	6.1
President	b	mean 3.4	4.2	3.8	2.4	13.8
		cv 12.3	6.5	28.8	47.5	16.7

Three sour cherry varieties have been dried only (Table 12). In the total number of points, the differences in taste and flavour appeared to be decisive because the other three characters received good ratings in all technological variants. 'Érdi bőtermő' tasted well in all samples, and received the best grade. The taste of the other two varieties did not attain the mediocre quality, except 'Újfehértói fürtös', „a” variant.

Table 11. Evaluation of deep frozen apricots  
Cegléd, November 9, 2005

Variety	Characters to be rated					
	Processing variant (a and b)	Colour (1-5)	Shape & size (1-5)	Consistency (1-5)	Taste & flavour (1-5)	Total (maximum 20 points)
Tom Cot	a	mean. 4.0 cv 0.0	4.0 13.4	4.5 10.3	2.8 40.5	16.3 6.5
	b	mean. 4.8 cv 7.6	4.1 15.4	4.6 15.9	2.6 40.8	16.1 9.0
Toyiba	a	mean. 3.0 cv 17.8	4.6 9.5	4.3 16.3	3.4 23.5	15.3 10.2
	b	mean. 3.8 CV 13.9	4.3 10.1	4.0 26.7	3.1 28.1	15.2 13.9
Magyar kajszi C.235	b	mean. 2.9 cv 29.5	4.4 10.5	4.4 16.5	2.9 34.7	14.6 10.4
Ceglédi biborkajszi	b	mean. 3.5 cv 13.2	4.7 9.6	2.0 26.7	3.6 37.0	13.8 12.1
Ceglédi arany	b	mean. 3.4 cv 21.3	4.6 9.6	2.2 38.5	3.2 28.0	13.4 9.8
Ceglédi biborkajszi	a	mean. 3.0 CV 25.2	4.6 15.9	2.4 33.5	3.1 25.1	13.1 12.7
Bergeron	b	mean. 4.1 cv 5.5	3.4 14.4	2.4 24.6	2.8 38.2	12.7 10.1
Ceglédi arany	a	mean. 2.9 cv 29.5	4.4 13.3	2.7 25.8	2.4 37.1	12.4 18.4
Magyar kajszi C.235	a	mean. 2.6 cv 28.3	3.5 19.0	2.9 35.9	3.1 33.1	12.1 19.7
Bergeron	a	mean. 3.4 cv 20.6	3.1 11.3	2.8 23.2	2.4 37.1	11.7 12.7

Table 12. Evaluation of dried sour cherries  
Cegléd, November 9, 2005

Variety	Characters to be rated					
	Processing variant size (a and b)	Appearance (attractiveness) (1-5)	Shape & flavour (1-5)	Consistency (1-5)	Taste & flavour (1-5)	Total (maximum 20 points)
Érdi bőtermő	b	mean. 4.8 cv 8.5	4.5 12.2	4.7 11.1	4.6 10.7	18.6 3.6
	a	mean. 4.8 cv 8.5	4.5 12.2	4.8 8.5	4.2 31.9	18.3 6.6
Kántorjánosi	b	mean. 4.7 cv 17.5	4.8 8.5	4.4 11.9	2.8 26.6	16.7 7.3
Újfehértói fürtös	a	mean. 4.4 cv 11.1	4.1 16.3	4.6 11.1	3.3 23.3	16.4 8.3
Kántorjánosi	a	mean. 4.7 cv 11.1	4.6 11.1	4.3 18.8	2.8 48.5	16.4 14.0
Újfehértói fürtös	b	mean. 4.5 cv 10.7	4.1 16.3	4.0 15.8	2.7 45.4	15.3 13.5

The quality of dried prune compared with the dried sour cherries showed inferior qualities as any variety and technology did not prove to be good (Table 13).

Table 13. Evaluation of dried prune  
Cegléd November 9, 2005

Variety	Characters to be rated					
	Processing variant size (a and b)	Appearance (attractiveness) (1-5)	Shape & flavour (1-5)	Consistency (1-5)	Taste & flavour (1-5)	Total (maximum 20 points)
Révfülöpi szilva II.	a	mean. 4.5 cv 15.7	4.1 16.6	3.7 17.1	3.8 29.0	16.1 14.3
	b	mean. 3.4 cv 21.3	3.6 12.1	4.5 10.3	4.1 16.6	15.6 7.4
Révfülöpi szilva I.	a	mean. 3.9 cv 15.0	4.2 17.8	3.9 15.9	3.4 39.7	15.4 16.8
Čačanska leptotica	a	mean. 4.1 cv 19.1	4.4 13.3	3.2 21.8	3.6 26.2	15.3 13.4
Besztercei Bt. 2	a	mean. 4.1 cv 19.1	4.3 16.3	3.2 33.1	3.4 26.4	15.0 19.4
Čačanska leptotica	b	mean. 4.3 cv 12.3	4.1 15.4	3.4 17.3	3.2 20.1	15.0 3.6
Révfülöpi szilva I.	b	mean. 3.9 cv 14.3	3.9 8.1	3.4 28.4	3.3 36.3	14.5 18.1
President II.	b	mean. 3.4 cv 41.2	4.3 16.3	3.6 28.1	3.2 31.0	14.5 20.2
Bluefre	a	mean. 3.8 cv 27.7	4.4 16.5	3.1 22.0	2.9 32.2	14.2 17.8
Stanley	a	mean. 3.4 cv 21.3	3.9 9.1	2.9 29.5	3.7 26.2	13.9 16.9
	b	mean. 3.2 cv 20.1	3.6 17.1	2.9 43.2	3.7 24.8	13.4 18.9
President I.	b	mean. 3.5 cv 30.3	4.0 26.7	3.0 28.2	2.9 27.6	13.4 24.3
President II.	a	mean. 3.2 cv 16.0	4.0 18.9	3.0 23.6	2.9 39.4	13.1 20.1
President I.	a	mean. 2.9 cv 23.1	4.0 13.4	3.1 41.2	2.7 32.4	12.7 18.1
Bluefre	b	mean. 4.1 cv 16.6	4.1 15.4	2.2 20.6	2.2 29.2	12.6 12.8
Besztercei Bt. 2	b	mean. 3.7 cv 19.0	3.9 17.3	1.9 21.6	2.9 23.1	12.4 12.1

Révfülöpi szilva I.: date of dehydration: Sept. 01. President I.: date of

dehydration: Sept. 06 Révfülöpi szilva II.: date of dehydration: Sept. 12.

President II.: date of dehydration: Sept. 12.

At most, two characters (appearance and shape-size) received better rating than 4: 'Besztercei Bt. 2', 'Révfülöpi szilva' dried later „a”, 'Bluefre' „b”, as well as 'Čačanska leptotica' in both variants. Out of the 6 samples the only 'Révfülöpi szilva' dried later as „b” variant had a good quality in consistency and taste.

#### Evaluation of the varieties examined from the point of view of suitability for industrial processing

The suitability was determined by the number of points (at least 4) received meaning good in any of the checked characters:



Species	Variety	Product
Sour cherry	Kántorjánosi	canned fruit fibrous fruit juice deep freezing
	'D' variety candidate	canned fruit deep freezing
	'T' variety candidate	canned fruit deep freezing
Apricot	Érdi bőtermő	dried fruit
	'R' variety candidate	deep freezing
	Ceglédi arany Ceglédi biborkajszi Magyar C. 235	fibrous fruit juice fibrous fruit juice fibrous fruit juice
Peach, nectarine	Babygold 5	canned fruit
	Caldesi 2000 Redhaven	canned fruit canned fruit
Plum	Stanley	canned fruit
	Besztercei Bt. 2	deep freezing

#### Summarised evaluation of stone fruit species for processed products

	Mean number of points received (maximum 5)							
	Canned fruit		Fibrous fruit juice		Deep freezing		Dried fruit	
	a*	b*	a*	b*	a*	b*	a*	b*
Sour cherry	4.3	4.3	4.1	3.8	4.2	4.2	4.3	4.2
Apricot	4.1	4.1	3.8	4.1	3.4	3.6	—	—
Peach, nectarine	4.3	4.2	3.6	3.5	—	—	—	—
Plum	3.8	4.0	—	—	4.2	4.1	3.6	3.5
Japanese plum	—	—	3.5	2.4	—	—	—	—

a\* and b\* are the two variants of processing technology

The organoleptic tests are performed to rate 5 characters for canned fruit, for other purpose only 4 characters. The number of accumulated points served as a criterion of suitability. The mean of the points received for any product facilitated the comparison of species on the level of different products.

Taking the 4 points as a threshold of quality, we may rate the species as well as the individual varieties:

1 Sour cherry is a good rough material for the purpose of processing (canned fruit, fibrous fruit juice, dried fruit) except for beverage with the remnants of kernels.

2 Apricot is recommended for canning and for fruit juice (with remnants of kernels).

3 Peach and nectarine are suitable for high quality canned fruit.

4 Plums should be pasteurised at lower temperatures than other fruits in canning. They are also recommended for deep freezing.

As far as the experiments of the following years, 2006 and 2007, will confirm our statements, we may extend our research on other varieties in order to find the best possible varieties for the purpose of different processed fruit products and various technologies: a) apricot for deep freezing, b) peach, nectarine, Japanese plum for fibrous fruit juice, and c) plums for dehydration.

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