Technological modes of pressing for cherry kernel oil production

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Abstract

Introduction. The aim of the research was to study the influence of temperature and duration of wet-heat treatment and pressing on the process of oil extraction from cherry pits.

Materials and methods. The raw material for making oil was the kernels of the following cherry cultivars: English Early, Lotivka, Lyubska, Griotte d'Ostheim, Podbyelska, and their mixture (20% of each sample). Treating cherry pits with NaCl solution was used. Modes of wet-heat treatment and pressing were studied.

Results and discussion. It was proposed to treat pits with NaCl. The mode selected as the most suitable for pits of different cherry varieties involves treating them with NaCl solution (one part rock salt to one part water) for 5–10 min. This treatment ensures that 90–100% of the pits crack. Thus, this is the optimum solution ratio to make this operation effective, which gives reasons for the proposed improvement of the technology.

Process conditions of cold pressing (extra virgin) have been determined for kernels of various cherry cultivars. The most practical temperatures of wet-heat treatment of crushed cherry kernels were as follows: 50–60°C and duration of 5–10 min for Podbyelska, English Early, Lotivka, Lyubska, and the mixture; 40–50°C and duration of 10–15 min for Griotte d'Ostheim.

It has been found that the pressing of cherry kernels was effective at temperature 60–70°C and duration of 6–15 min for Podbyelska, English Early, Lotivka, Lyubska, and the mixture, and at temperature 50–60°C and duration of 4–10 min for Griotte d'Ostheim. The parameters of the pressing extraction stage most effective for the kernels of all the cherry cultivars were: residual oil content in the oilcake 5.0—6.0%; oil yield 94.0%; oilcake thickness 1.8 mm (English Early), 2.0 mm (Lotivka), 1.7 mm (Lyubska), 2.2 mm (Griotte d'Ostheim), 2.0 mm (Podbyelska), and 1.8 mm (the mixture); load resistance time 6 min (English Early), 8 min (Lotivka), 10 min (Lyubska), 4 min (Griotte d'Ostheim), 10 min (Podbyelska), and 15 min (the mixture); and, for all samples, compressive strength 10.0 kN and rate of load application 5.0 kN/cm.

Conclusion. The results showed the practical value of preliminary processing of cherry pits before removing kernels from them, substantiated the choice of temperature and duration of their wet-heat treatment and pressing. The results were confirmed when these methods were introduced into the technology of oil production from cherry kernels of different varieties.

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Introduction

Cherry (*Prunus avium*) is classified as a type of fruit called a drupe. Drupes consist of a thin skin, a fleshy body, a pit (or stone), which is composed from a hard outer shell and internal kernel (or seed). Cherry fruits contain a number of valuable substances necessary for the human body and are an integral part of a balanced diet. It is widely used in Europe, North America, and Asia. The global output of cherry fruit has increased over the last few years from 14.1 million to 38.1 million metric tons (Chatzimitakos et al., 2024).

Cherry fruit contains organic acid, sugars, phenolic compounds, soluble dietary fibre, and vitamin C (Sezer et al., 2021). One of the main components of a cherry kernel is oil (17–36%), which is a rich source of polyunsaturated and monounsaturated fatty acids. Amino acids such as lysine (essential amino acid) and glutamic acid (dominant amino acid), minerals such as calcium and potassium, and vitamins thiamine (B1), niacin (B3), pantothenic acid (B5), and pyridoxine (B6), are valuable compounds found in cherry kernels (Górnaś et al., 2016).

Adding natural additives, including fruit processed materials, to recipes of traditional food products is a modern trend that allows increasing their nutritional value and sensory properties (Stabnikova et al., 2021). Dried pomace, a by-product of cherry processing, can be crushed and immediately used in food recipes. For example, destoned cherry pomace was added to muffins as a source of phenolic antioxidants (Bajerska et al., 2016). Gumul et al. (2020) proposed adding extruded cherry pomace to gluten-free bread.

Extracts of pitted cherry pomace contain significant amounts of phenolic compounds. Encapsulation of such extracts allows obtaining preparations with a high content of phenolic compounds, which can be used in the manufacturing of functional foods (Pavlović et al., 2023; Toprakçı et al., 2023). Sweet cherry pomace is rich in pectin substances and can serve as a source of it (Zhang et al., 2023). The possibility of simultaneous extraction of pectin and phenols from cherry pomace was shown (Hosseini et al., 2020).

Cherry kernels are characterised by a high content of protein and fat and can be viewed as a raw material for oil production (Kazempour-Samak et al., 2021a; Maryam et al., 2022). Oil from cherry kernels is a powerful anti-inflammatory agent and antioxidant (Maragheh et al., 2019). The potential use of cherry kernels as a raw material to extract lipids was shown, but this process was restricted by high moisture content (Kniepkamp et al., 2024). Oil from *Prunus* kernels is high in unsaturated fatty acids and bioactive compounds (Natić et al., 2020).

It was reported that various techniques, such as solvent extraction, microwave, ultrasound, and extraction using supercritical fluid, enzyme-assisted methods, and cold pressing could be used to extract oil from drupes (Azmir et al., 2013). Kazempour-Samak et al. (2021b) studied oil production from fresh cherry kernels by cold pressing. The oil and moisture contents were found to be 31.89% and 4%, respectively. The sensory evaluation of the oil was acceptable, and the free fatty acid value was 1.36 mg KOH/g oil. Besides, the peroxide value and anisidine index of the cherry kernel oil were obtained as 0.99 mg O_2/kg oil and 0.15 mg O_2/kg oil, respectively.

The physicochemical parameters, fatty acid composition, and yield of cherry kernel oil depend on the cherry cultivar (Canbay and Doğantürk, 2019). Başyiğit et al. (2020, 2021) extracted oil from sour cherry kernels using cold pressing and characterised its physicochemical properties. The prevailing carotenoid in extracted oil was zeaxanthin (13.15 mg/kg) and it was rich in essential to human unsaturated fatty acids. High-quality oils was obtained at low temperatures by cold pressing containing of ω6 (linoleic, C18:2ω-6) and ω3 (alpha-linolenic, C18:3ω-3) polyunsaturated fatty acids with ω6/ω3 ratio 5:1 (Kmiecik et al., 2022), close to their accepted optimal value for healthy nutrition 4:1 (Stabnikova and Paredes-Lopez, 2024). However, the effects of wet-heat treatment prior to pressing remain unstudied.

Despite the great progress in oil production technology and techniques (including modern high-performance continuous screw presses), the process of obtaining oil by mechanical pressing has a significant drawback: the cake contains too much residual oil, which is lost along with it (Kotlyar and Gladkikh, 2023).

From the above, it is evident that a very valuable and promising raw material for oil production is cherry kernels because they contain beneficial nutritional and biological substances (Dimić et al., 2023; Stryjecka et al., 2019, 2022). Meanwhile, by-products and wastes generated in the agro-industrial sector and the food processing are not fully utilized (Protzman, 2023; Salo et al., 2024). Therefore, it makes sense to study pressing modes that include pre-treatment of cherry pits before kernel extraction, as well as to analyse the effect of temperature and duration of wet-heat treatment and pressing.

Material and methods

Raw materials

The following cherry varieties (harvested in 2021, 2022 and 2023) were selected as sources of cherry pits kernels that were used as raw materials for oil extraction (Figure 1a–f).

Figure 1a. English Early: fruit, pits, and kernels

Figure 1b. Lotivka: fruit, pits, and kernels

Figure 1c. Lyubska: fruit, pits, and kernels

Figure 1d. Griotte d'Ostheim: fruit, pits, and kernels

Figure 1e. Podbyelska: fruit, pits, and kernels

Figure 1f. Mixture: pits (left) and kernels (right) (20% of each sample)

Characteristics of the raw materials

Moisture content was measured by the rapid method involving the single-time keeping of the kernels and the hard shells of cherry pits in a drying chamber at a certain temperature and duration, according to (Canbay and Doğantürk, 2019; Górnaś et al., 2016).

The content of impurities and oil admixtures, the volumetric mass of the cherry pits, the length of a cherry pit, and the weight of 1000 cherry pits were determined according to (Canbay and Doğantürk, 2019).

Operating modes of pressing in laboratory conditions to produce oil from cherry kernels

Firstly, cherry kernels were cleaned from impurities. Next, the pits were treated in a 2% sodium chloride solution at a ratio of 1:1 for 3–5 minutes to soften the shell. The treated pits were then split.

Determination of the parameters of moisture-heat treatment and their influence on oil yield

100 g of cherry kernels were ground on the LZMK-1 mill as fine as 90–95% of the undersize from a 1 mm sieve. The crushed kernels were subjected to wet-heat treatment at the certain temperature and duration of saturation of the crushed kernels with steam. The temperature of the crushed kernels during the wet-heat treatment was regulated from 30 to 50°C, and the process duration from 10 to 20 min. The oil was obtained by pressing on a laboratory manual press PROM-1U. The oil yield was determined as a percentage of the maximum oil content in cherry kernels.

Determination of the parameters of pressing crushed kernels and the influence of these parameters on the oil yield

The pulp obtained because of the wet-heat treatment of crushed kernels was pressed using a laboratory hydraulic press of the U1 EPM type. 100 g of the pulp was poured into the press container, closed with a plunger. Using a hand pump, the pressure was increased to the maximum indicated on the manometer P = 0.072 mPa. During the pressing process, the temperature was adjusted to 40–60°C, the rate of load application to 5–15 kN/cm, the compression strength to 10–20 kN, and the duration of the loading was 3–8 min. The thickness of the pressed pulp and the yield of oil were determined, respectively, in mm and in % after they flowed into a pre-weighed flask.

Physicochemical study

The content of moisture in the crushed material was measured by the rapid drying method or using an electrical moisture meter (Latif et al., 2011).

The thickness of a cherry oilcake piece was measured according to (Latif et al., 2011). This measurement is necessary in order to monitor daily the operation of the press, and when testing new makes of presses.

The oil content in the cherry pit kernels, oilcake, and pores of the crushed material was determined by exhaustive extraction in a Soxhlet extractor according to (Başyiğit et al., 2021).

The acid value was determined according to (Topchij et al., 2016). The oil obtained before pressing (in the Soxhlet extractor) and after pressing the kernels of different cherry cultivars by the above methods was placed in a 250 ml conical flask. Three to five grams of the oil analysed were weighed with accuracies down to 0.01 g and heated on a water bath, then 50 ml of neutralised alcohol/hexane mixture was poured into the vessel to fill it up, and the sample was stirred. The resulting solution, continuously stirred, was quickly titrated with a potassium or sodium hydroxide solution (C (KOH) = 0.1 mol/l) until it became distinctly pink and could keep the colour for 30 s.

During titration with a potassium or sodium hydroxide solution, the quantity of alcohol in the composition of the alcohol/hexane mixture should be 5 times as big as the volume of the potassium or sodium hydroxide solution, to avoid hydrolysis of the soap formed. The acid value (AV) expressed in mg KOH/g was calculated according to the formula:

$$AV = \frac{V \cdot k \cdot c(KOH) \cdot M(KOH)_{eq}}{m},$$

where V is the volume of the KOH or NaOH solution spent on titration, ml;

k is the correction coefficient for the alkali solution to be expressed in terms of exact 0.1 mol/l;

m is the weight of the oil under study, g;

$c\ (KOH)$ is the molar concentration of the alkali, 0.1 mol/l;

$M\ (KOH)_{eq}$ is the molar equivalent mass equal to 56.11 g/mol.

The lipid content in the cherry kernels was measured by the hexane extraction method and by pressing, and that in the oilcake and pores of the crushed material – by exhaustive extraction in a Soxhlet extractor according to (Dominik et al., 2022).

Statistical analysis

All the numerical data obtained were processed with the Excel program from the service software package Microsoft Office 2007. The numerical data were presented as mean and the standard deviation.

Results and discussion

Characteristics of raw materials

Globally, there are quite few studies considering the quality parameters of cherry pits depending on their varietal features and year of harvest. After the raw material (cherry kernels) enters oil enterprises, the very first test is the determination of impurities, as they affect the output and general quality of the final product. The quality indicators of kernels and pits of different cherry cultivars are presented in Table 1.

According to the research results shown in Table 1, Griotte d'Ostheim is the variety with the highest average content of impurities found in the kernels after processing the fruit from which they are obtained (1.41±0.3 %). The mixture is the lowest in impurities (0.51±0.1 %). One can regard all the samples as complying with the general quality standards. No sample was infected or treated with pesticides. In the studies of Górnaś et al. (2016) and Canbay and Doğantürk (2019), a significant level of contamination in cherry pits (1.50%) was shown, but the obtained values did not affect their further processing.

The increased moisture in raw materials during their storage can activate unwanted processes in them (oxidative, hydrolytic), intensify their respiration, and promote the activity of microbiota that leads to the quality degradation (Górnaś et al., 2016). That is why, prior to directing the material for storage or processing, its moisture content is determined.

When determining this parameter, the moisture contents of the shell and the kernel were measured individually, and their average percentage was calculated. The moisture content of English Early was 7.9±0.3 %, Lotivka – 7.8±0.3 %, Lyubska – 7.0±0.3 %, Griotte d'Ostheim – 5.2±0.2 %, Podbyelska – 6.7±0.3 %, and the mixture – 7.0±0.4 %.

Table 1

Quality indicators of kernels and pits of different cherry varieties

Indicators	**English Early**			**Lotivka**			**Lyubska**			**Griotte d'Ostheim**			**Podbyelska**			**Mixture (20% of each sample)**		
	Years																	
	2021	**2022**	**2023**	**2021**	**2022**	**2023**	**2021**	**2022**	**2023**	**2021**	**2022**	**2023**	**2021**	**2022**	**2023**	**2021**	**2022**	**2023**
Impurities, %	1.20 ±0.3	0.34 ±0.6	0.67 ±0.1	1.03 ±0.5	1.00 ±0.8	1.12 ±0.2	1.25 ±0.3	0.70 ±0.4	0.97 ±0.2	2.18 ±0.1	1.41 ±0.2	0.64 ±0.1	0.95 ±0.7	0.90 ±0.9	1.36 ±0.3	0.25 ±0.1	0.70 ±0.2	0.57 ±0.1
Moisture, %	7.00 ±0.3	8.00 ±0.4	8.70 ±0.5	8.50 ±0.4	7.00 ±0.2	8.00 ±0.3	7.00 ±0.4	6.00 ±0.2	8.0 ±0.4	7.10 ±0.3	4.50 ±0.2	4.10 ±0.2	7.20 ±0.3	6.50 ±0.3	6.50 ±0.3	7.00 ±0.4	6.00 ±0.3	8.0 ±0.4
Kernel content in the pits, mm	0.90 ±0.2	0.85 ±0.1	0.80 ±0.1	0.85 ±0.2	0.80 ±0.1	0.75 ±0.1	0.75 ±0.1	0.70 ±0.1	0.60 ±0.1	0.90 ±0.3	0.85 ±0.2	0.80 ±0.2	0.80 ±0.1	0.85 ±0.1	0.80 ±0.1	0.85 ±0.2	0.80 ±0.1	0.75 ±0.1
Weight of 1000 pits, kg	210 ±0.3	210 ±0.2	215 ±0.2	245 ±0.4	240 ±0.4	245 ±0.3	170 ±0.3	170 ±0.2	165 ±0.3	210 ±0.5	205 ±0.4	210 ±0.5	240 ±0.2	235 ±0.3	240 ±0.2	190 ±0.1	190 ±0.2	190 ±0.1
Oil content, %	24.75 ±0.3	24.70 ±0.6	24.70 ±0.1	20.03 ±0.5	19.00 ±0.8	21.10 ±0.2	29.10 ±0.3	28.60 ±0.4	28.50 ±0.4	22.70 ±0.1	23.41 ±0.2	23.02 ±0.1	26.95 ±0.7	24.90 ±0.9	25.54 ±0.3	24.80 ±0.1	23.70 ±0.2	22.50 ±0.1
Acid value, mg KOH/g	1.20 ±0.1	1.30 ±0.3	1.20 ±0.2	0.80 ±0.1	0.90 ±0.1	0.70 ±0.1	1.40 ±0.3	1.10 ±0.1	1.20 ±0.2	0.50 ±0.1	0.40 ±0.1	0.20 ±0.1	1.30 ±0.3	1.40 ±0.4	1.50 ±0.3	0.60 ±0.1	0.50 ±0.1	0.40 ±0.1

The kernel size determines the price, the saleability of the product, and the yield of oil. Normally, bigger kernels are spent in bigger quantities, and vice versa, and this should be taken into account when processing them. The kernels were measured with vernier callipers. The results obtained correlate with the findings of Górnaś et al. (2016) and Canbay and Doğantürk (2019), which did not exceed 8.20%. Based on the findings, it can be concluded that every variety ofcherry has its own average size of a pit. Thus, size of English Early pit was 0.9±0.2 mm; of Lotivka – 0.85±0.2 mm; of the mixture – 0.85±0.2 mm. Górnaś et al. (2016) and Canbay and Doğantürk (2019) obtained almost the same results (0.9 mm), but without taking into account the varietal features of cherries, though this is highly important when setting up the equipment and technological process.

Besides, studies conducted in enterprises include weighing 1,000 cherry pits. The weight of 1,000 cherry pits averages, depending on the cultivar: English Early – 210±0.3 g, Lotivka – 245±0.4 g, Lyubska – 170±0.3 g, Griotte d'Ostheim – 210±0.5 g, Podbyelska – 240±0.2 g, and the mixture – 190±0.1 g. Górnaś et al. (2016) and Canbay and Doğantürk (2019) obtained 220 g for cherry pits.

Oilseed lipids contain various groups of substances with different physicochemical properties and biological significance (Canbay and Doğantürk, 2019).

Based on the average data presented in Table 1, the content of oil varies with the variety of cherry pit kernels. The average oil percentage is the highest in Lyubska (28.7±0.4 %), and the lowest is that of the Lotivka kernels (20.0±0.3 %). Górnaś et al. (2016) researched the kernels of six cherry cultivars for their oil content. The average of this parameter was 31.8%.

When oils are in storage, hydrolysis takes place in them due to the action of enzymes, microorganisms, high temperatures, moisture, light, and other factors (Dominik et al., 2022).

High temperatures and exposure to light activate ester bonds in acyl glycerol, and the presence of moisture causes the development of microorganisms (Topchij et al., 2016). Hydrolysis results in the release of free fatty acids, and their content characterises the acid value (Latif et al., 2011). The acid value determines the freshness of oil and is the number of milligrams of potassium or sodium hydroxide necessary to neutralise free fatty acids contained in 1 g of oils or fat (Başyiğit et al., 2020, 2021).

The average results presented in Table 1 prove that the samples under study meet the general requirements, and the acid value in the samples never exceeds 3.0±0.3 mg KOH/g. Başyiğit et al. (2021) state that the acid value depends on the crop year and varietal features.

Operating modes

Two modes of processing cherry pits with a salt solution were considered to ensure their most complete cracking (Table 2).

Table 2

Selection of the pre-treatment mode for cracking the pits

Cherry varieties	%, cracking	
	33% NaCl, 5 min	50% NaCl, 10 min
English Early	65 ± 5	95 ± 5
Lotivka	73 ± 5	95 ± 5
Lyubska	69 ± 3	95 ± 5
Griotte d'Ostheim	73 ± 7	95 ± 5
Podbyelska	68 ±7	95 ± 5
Mixture	67 ± 8	95 ± 5

The first mode included short-term treatment for 5 minutes with a 33% NaCl solution, and the second treatment used a 50% salt solution and duration of treatment was 10 minutes. The use 50% solution of sodium chloride (one part rock salt to one part water), with the treatment duration 10 min resulted in 90–100% cracking of the pits. This indicates the recommended ratio of the solution components for this technological operation and gives reasons for the proposed improvement of the technology by the method described in the section Materials and methods.

The wet-heat treatment of the crushed cherry kernels was provided in three steps differing in temperature (t) and processing time (τ): I – 40°C, 3 min; II – 50°C, 5 min; III – 60°C, 10 min. For all the studied cherry varieties, as well as for their mixture, the same pattern was established. The degree of filling the pores in crushed kernels with oil depends on the parameters of the wet-heat treatment (its temperature and duration) and was as follows: 80% after step I; 90% after step II, and 100% after step III. Thus, the moisturising was the most effective at the second and third stages, as compared with the first ones. The crushed mass of cherry kernels of the cultivars Podbyelska, English Early, Lotivka, Lyubska, and their mixture has the treatment temperature 50–60°C, τ 5–10 min; Griotte d'Ostheim – 40–50°C, τ 10–15 min. In addition, in all the cultivars and in their mixture, the pores in the crushed kernels are completely open and filled with oil: by 90% at the second stage and by 100% at the third stage (see the method described in the section Materials and methods). All this creates favourable conditions for the further stage of processing. The temperature conditions, duration, and oil yield are given in Table 3.

The processed mash enters the press for final removal of oil (Kazempour-Samak et al., 2021b; Yılmaz et al., 2020). This is an element of the manufacturing line where oil is obtained by the cold pressing of different varieties of cherry kernels. It has been established that the pressing of cherry kernels is effective at t = 60–70°C, τ 6–15 min for Podbyelska, English Early, Lotivka, Lyubska, and their mixture and at t = 50–60°C, τ 4–10 min for Griotte d'Ostheim (Table 3).

Table 3

Pressing modes

Parameters	**English Early**			**Lotivka**			**Lyubska**			**Griotte d'Ostheim**			**Podbyelska**			**Mixture (20% of each sample)**		
	Stages																	
	I	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**
Temperature, °C	50	60	70	50	60	70	50	60	70	40	50	60	50	60	70	50	60	70
Time, min	3	6	15	3	6	15	3	6	15	2	4	10	3	6	15	3	6	15
Oil yield, %	94	92	89	94	93	88	94	91	86	94	93	90	94	92	88	94	92	88
Thickness of oilcake piece, mm	1.8±0.01			2.0±0.02			1.7±0.03			2.20±0.04			2.0±0.02			1.8±0.03		

Oil pressed out of various cherry cultivars contains many suspended particles, including the mineral ones (Kniepkamp et al., 2024). The oil is purified from mechanical impurities by settling. After this, it is storable or ready for further use (Maragheh et al., 2019). Oilcake is good as animal feed. It can also be used as a fertiliser or as a food additive in the human diet (Azmir et al., 2013).

The thickness of an oilcake piece is a major indicator of the operation of a press (Natić et al., 2020). The determination of this parameter allows monitoring daily the operation of a press, and is necessary when testing new makes of presses (Canbay and Doğantürk, 2019). The thickness of the oilcake pieces is as follows: English Early – 1.8±0.01 mm, Lotivka – 2.0±0.02 mm, Lyubska – 1.7±0.03 mm, Griotte d'Ostheim – 2.20±0.04 mm, Podbyelska – 2.0±0.02 mm, and the mixture – 1.8±0.03 mm.

According to the data presented in Table 3, the temperature and duration of treating the kernels to obtain the mash were as follows: for the cultivars Podbyelska, English Early, Lotivka, Lyubskaya, and their mixture – 50–60°C, τ 5–10 min; for Griotte d'Ostheim – 40–50°C, τ 10–15 min.

This is an element of the production line where oil is obtained by cold pressing the pits of different varieties of sour cherries. The data in Table 4 show that the pressing of cherry pits of different varieties is effective with the following parameters (see the method described in the section Materials and methods): Podbielska, Early English, Lotivka, Lyubska and their mixture – t = 60–70°C, τ 6–15 min; Griotta d'Ostheim – t = 50–60°C, τ 4–10 min. The oil obtained passes the primary stage of refining and is directed for bottling, labelling, packaging, and storage. The press cake is portioned, labelled, and put into storage.

Conclusions

1. A number of cherry cultivars were analysed as sources of raw materials for the manufacture of oil from kernels of cherry pits. As a result, it was found that the following cultivars were the most promising for studying the kernels of their pits: English Early, Lotivka, Lyubska, Griotte d'Ostheim, Podbyelska, and their mixture (20% of each sample). These cultivars are the ones most often used in the fruit-processing and canning industries.

2. As for the contamination level, the research results show that the cultivar with the highest average content of impurities is Griotte d'Ostheim (1.41%), and the mixture is the lowest in impurities (0.51%). One can regard all the samples as complying with the general quality standards. No sample was infected or treated with pesticides. The average mass fraction of moisture in the samples of cherry pits under study (harvested in 2021–2023) is as follows: English Early – 7.9%, Lotivka – 7.8%, Lyubska – 7.0%, Griotte d'Ostheim – 5.2%, Podbyelska – 6.7%, and the mixture – 7.0%. One can conclude that all the samples meet the requirements. The average size of a cherry pit depends on the variety: English Early – 0.9 mm, Lotivka – 0.85 mm, Lyubska – 0.75 mm, Griotte d'Ostheim – 0.85 mm, Podbyelska – 0.9 mm, and the mixture – 0.85 mm. The weight of 1,000 cherry pits depends on the cultivar and averages: English Early – 210 g, Lotivka – 245 g, Lyubska – 170 g, Griotte d'Ostheim – 210 g, Podbyelska – 240 g, and the mixture – 190 g. The average mass fraction of oil varies with the variety of cherry kernels. The average oil percentage is the highest in Lyubska (28.7%), and the lowest is that of the Lotivka kernels (20%). The average acid value in the oils prepared from the samples of cherry kernels under study never exceeds 3.0 mg KOH/g, which meets the general requirements.

3. The mode selected as the most suitable for pits of different cherry cultivars involves treating them with 1:1 NaCl solution (one part rock salt to one part water) for 5–10 min. This treatment ensures the cracking of 90–100% of pits. Thus, this is the optimum solution ratio

to make this operation effective, which gives reasons for the proposed improvement of the technology.

4. It has been found that the most practical temperatures of wet-heat treatment of crushed cherry kernels are as follows: for Podbyelska, English Early, Lotivka, Lyubska, and the mixture – 50–60°C, τ 5–10 min; for Griotte d'Ostheim – 40–50°C, τ 10–15 min.

5. The pressing of cherry kernels of different cultivars is effective at t = 60–70°C, τ 6–15 min for Podbyelska, English Early, Lotivka, Lyubska, and their mixture, and at t = 50–60°C, τ 4–10 min for Griotte d'Ostheim.

6. The parameters of the pressing extraction stage found to be the most effective for the kernels of all the cherry cultivars are: residual oil content in the oilcake 5.0—6.0%; oil yield 94.0%; thickness of the oilcake: 1.8 mm (English Early), 2.0 mm (Lotivka), 1.7 mm (Lyubska), 2.2 mm (Griotte d'Ostheim), 2.0 mm (Podbyelska), and 1.8 mm (the mixture); load resistance time: 6 min (English Early), 8 min (Lotivka), 10 min (Lyubska), 4 min (Griotte d'Ostheim), 10 min (Podbyelska), and 15 min (the mixture); and, for all samples, compressive strength 10.0 kN and rate of load application 5.0 kN/cm.

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