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Development of a technology of fat-and-oil products from plum kernels

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Abstract

A number of plum cultivars have been analysed as a source of raw materials to obtain oil from the kernels of plum stones. As a result, it has been found promising to study the kernels of plums extracted from the cultivars Friar, President, Greengage (Reine Claude), and Uhorka, because these varieties are most often used in the fruit-processing industry.

The operating modes have been improved, with the introduction of wet-heat treatment. When processed, the crushed plum kernels were moisturized with steam before they entered the press. To overcome or weaken the forces that bind oil with the upper parts of the crushed kernels, and to facilitate its separation from the oil-free components, we use wet-heat treatment. This process consists in treating the crushed kernels with hot vapour, which is accompanied by intensive stirring, to obtain a sufficiently heated and moisturized product termed mash. The temperature and duration of the wet-heat treatment of the kernels were as follows: for the cultivars Friar and President – 40–50 °C, τ 10–15 min, followed by pressing at 50–60 °C for 3–8 min; for the cultivars Greengage and Uhorka – 45–55 °C, τ 15–18 min, followed by pressing at 55–65 °C for 5–8 min.

The oilcake piece was the thinnest in the cultivar Greengage – 21 mm, and the thickest in the cultivar Friar – 25 mm. The data obtained are positive and prove the high performance of the operating modes used.

Sensory assessment of the oil and oilcake was carried out for the kernels of each plum cultivar. The appearance and smell of all the samples were rated 5 points. Almost the same was the score of the colour and consistency in all the cultivars. However, the taste scores were quite different. The lowest score was that of the oil and oilcake from the cultivar Uhorka, because its oil had a bitterish shade of taste.

Keywords: crushed kernels; wet-heat treatment; pressing; mash; plum-kernel oil; plum oilcake

1. Introduction

Although food originates from natural materials, its stability changes in the course of a certain period of time. Above all, it is affected by improper storage conditions. This factor triggers changes in its sensory characteristics (smell, taste, colour), and in the end, results in spoilage. Some additives, in the form of aromatic chemicals, are introduced to preserve food and restore its original qualities. There are numerous studies of such food ingredients as vitamins, polyphenols, terpenes, fatty acids, and all types of products of animal and plant origin. Fruit are plant-derived foodstuffs containing various substances and having a strong effect on the human body. Their antioxidant activity is extremely important for the prevention of tumours (Chun et al., 2004). Whatever the case, botanical parts are essential in the diet and beneficial for one's health (Rop et al., 2009). Apart from water, plum fruit (Prunus domestica) also contain sugar, acids (Usenik et al., 2008), vitamins, nitrogenous components, pungent and volatile substances, coloured matters (Mišić, 2006). In the course of ripening, plums change their chemical composition, so the content of certain anthocyanins can be increased (Usenik et al., 2009), while the amount of organic acids is variable. The phenolics detected in plum fruit included neochlorogenic acid, p-coumaroylquinic acid, chlorogenic acid, and rutin (Usenik et al., 2008). Also, a significant increase in antioxidant compounds was observed during fruit ripening (Kristl et al., 2011). The commonest phenolic antioxidant was amygdalin, which accounted for over 90 % of the total phenolics identified in the kernels of plum stones (Khallouki et al., 2012).

The scientists from Nigeria Uchenna Johnson Amah et al. researched the potential usefulness of kernels of the wild black plum (Vitex donia) from Ebonyi State by assessing the nutritional and phytochemical attributes of the stone which is usually discarded as waste after consumption of the fruit pulp. Fat and protein were the major nutrients found in the kernels, with values of 36.52 % and 27.57 % respectively. The fatty acid profile showed that monounsaturated oleic acid (58.54 %) and saturated palmitic acid (34.24 %) were the predominant fatty acids in the kernels, while thrionine (7.55 %) and methionine (6.22 %) constituted the major essential amino acids, and proline (8.64 %) and glutamic acid (7.33 %), the major non-essential amino acids. The total essential amino acid content was recorded to be 37.17 %, indicating that kernels could be considered a good source of essential amino acids. The ash content 5.18 % was an indication that the wild seed contained reasonable amounts of minerals. In terms of phytochemicals, appreciable amounts of alkaloids (11.40 mg/100 g) and flavonoids (3.75 mg/100 g) were recorded, as well as a high level of phenolic compounds (170 mg/100 g). This suggests that kernels could have good antioxidant properties. The above findings are indications of the great potential of wild black plum kernels as a good source of nutrients and phytochemicals (Amah et al., 2019).

D. Redondo et al. proved thinned drupes to be a source of polyphenols and antioxidant compounds. The paper investigated the phenolic profile and the antioxidant activity of some thinned stone fruits, including plums. The study shows that thinned plum extracts can be used as antioxidants in foods or as a source of compounds with health-related benefits that find applications in the pharmaceutical, cosmetic, and food industries (Redondo et al., 2017).

P. Górnaś et al. studied the composition of tocochromanols in kernels extracted from plum stones, in particular, the profile of tocopherol (T) and tocotrienol (T3) homologues in kernels recovered from 28 various cultivars of the hexaploid species Prunus domestica L. and the diploid plum Prunus cerasifera Ehrh. and its crossbreeds. In all the samples studied, one tocotrienol (α-T3) and four tocopherol homologues (α, β, γ, and δ) were determined by the RP-HPLC/FLD method. The concentration of tocochromanols varied considerably in kernels of different plum varieties and amounted, respectively: 3.55–11.84 (α-T), 0.01–0.13 (β-T), 30.58–73.63 (γ-T), 0.71–4.04 (δ-T), 0.24–1.47 mg/100 g dw (α-T3). The total content of tocochromanols ranged 36.86–83.38 mg/100 g dw. The average percentage of individual tocochromanols detected in the plum kernels was as follows: α-T (11.6 %), β-T (0.1 %), γ-T (83.6 %), δ-T (3.5 %), and α-T3 (1.2 %). The concentration of tocopherol homologues and α-T3 in kernels of the diploid plums P. cerasifera and its crossbreeds was on average ~20 % lower, with the exception of δ-T (50 % lower), in comparison with P. domestica. The principal component analysis allowed classifying the tested samples into two main groups (Górnaś et al., 2015).

R. K. Shukla and other researchers evaluated the nutritive value, phytochemical screening, total phenolic content, and in vitro antioxidant activity of Prunus domestica L. kernels. The results show that it is a good source of energy. Phytochemical screening revealed the presence of many secondary metabolites which include alkaloids, carbohydrates, glycosides, protein, steroids and terpenoids, fixed oils and fats, as well as phenolic compounds. The highest total phenolic content was found in the ethyl acetate fraction. The highest antioxidant activity by the DPPH method was reported in the ethyl acetate fraction (IC50=1837.399±0.377 μg/ml), while the ferric reducing antioxidant power was maximum for diethyl ether (56.032±0.985 μM/ml, FRAP value = 0.325±0.002) (Shukla et al., 2021).

Due to this chemical composition, plum kernel oil can be used in food products. It is also an excellent base for dry and mature skin care products. It is easily smeared on the skin leaving no greasy traces, and can help the skin damaged by burns (Kiralan et al., 2018). In addition to the commonly used Soxhlet extraction technique, researchers try to isolate the oil using ultrasound-assisted and supercritical extraction (Anwar et al., 2014; Górnaś et al., 2016). Until now, n-hexane has mostly been used for the extraction of plum kernel oil.

The level of bioactive compounds in kernel oil depends on the extraction method used. Although non-traditional techniques are currently used that reduce the use of solvents (cold pressing, supercritical methods, ultrasonic-assisted extraction, and microwave-assisted extraction), the reference method par excellence is Soxhlet extraction. Due to its simplicity and high extraction yield, it is one of the most widely used techniques for the recovery of fatty acids from oils (Kumar et al., 2017).

M. Kiralan et al. evaluated the oxidative stability of cold-pressed plum (Prunus domestica) kernel oil (PKO) and apricot (Prunus armeniaca) kernel oil (AKO) under thermal-oxidation and photo-oxidation conditions. Changes in the peroxide value (PV), conjugated dienes (K_{232}), and the levels of volatile compounds in the cold-pressed oils were monitored during storage for 12 days under oxidation conditions. Under thermal oxidation conditions, the PV of PKO reached its maximum (63.8 meq O_2/kg) after 12 days of storage, while the PV of AKO reached its maximum (54.5

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meq O_2/kg) after 10 days of storage. The K_{232} values exhibited similar behaviour under accelerated oxidation conditions, where the highest K_{232} values were 12.38 and 10.91 for PKO and AKO on the 12th and the 10th day of storage respectively. Under photo-oxidation conditions, both values demonstrated similar behaviour. At the end of storage (day 12), the PV reached 117.5 and 67.62 meq O_2/kg for PKO and AKO respectively. Similarly, the maximum K_{232} values were 5.72 and 4.56 for PKO and AKO respectively. For hexanal, and E-2-heptenal, the values recorded were 149.2 and 41.83 × 10^6 AU for PKO after 12 days of storage under thermal oxidation conditions, while hexanal and E-2-heptenal reached 199.2 and 58.88 × 10^6 AU for AKO after only 10 days of storage. After 12 days of storage under photo-oxidation of PKO and AKO, aldehydes were detected as the most identified chemical group (especially hexanal and E-2-heptenal) in the photo-oxidized PKO and AKO (Kiralan et al., 2018).

Despite a great progress in diagnosing and treating malignant tumours, this disease is still one of the causes of death in humans (Aporta et al., 2014). Today, numerous chemotherapeutic preparations for this disease can be found on the market. Due to their toxicity, most chemotherapy drugs cannot be applied in the doses that can completely inhibit the growth of tumour cells in the organism. Lately, the studies have been focused on the application of herbal agents, including amygdalin, in the treatment of these diseases. Amygdalin is a natural chemotherapeutic agent found in more than 1,200 plants, particularly in the kernels of fruits such as apricots, peaches, plums, and apples (Bolarinwa et al., 2014). In fact, it is cyanogen glycoside that contains two glucose molecules in its structure, benzaldehyde (an analgesic) and a cyanide group. Pharmacological studies of amygdalin were mainly related to isolated amygdalin, mostly from the kernels of apricot (Prunus armeniaca) stones (Frohne et al., 2005).

Thus, utilization of byproducts of the fruit industry, especially seeds and kernels of stones rich in tocochromanols, can result in significant health benefits. The information about the tocochromanol profile in plum kernels is quite limited though. We only know three studies that were partially focused on tocochromanols in the composition of oil recovered from plum kernels (Hassanein, 1999; Matthaeus et al., 2009; Picuric-Jovanovic et al., 1997). What is more, the properties of plum varieties and difference between them were not taken into account, except in one study where three plum cultivars were considered (Matthaeus et al., 2009). All previous studies were only focused on P. domestica and gave no information about diploid plums (e.g., P. cerasifera and its crossbreeds). Neither there was any information on studying oilcake from plum kernels. So, it looks quite promising to analyse and assess the composition of tocochromanols and other useful substances in plum kernels and in oil and oilcake recovered from them.

2. Materials and Methods

2.1. The following plum cultivars (harvested in 2022, 2023, and 2024) were selected as the source of the plum pit kernels that became the raw materials for oil: Friar, President, Greengage (Reine Claude), and Uhorka.

2.2. In a laboratory environment, a method of recovering extra virgin oil from the kernels of plum stones was developed. Firstly, plum kernels were cleaned from impurities. Next, the stones were treated in a sodium chloride solution (1:1 % NaCl:H2O) for 5–10 minutes to soften the shell. The treated stones were then split, and fragmented mass composed of kernels and their outer shells was obtained.

The main thing needed to obtain oil is the destruction of the cellular structure of plum kernels. The ultimate result of the crushing is the transition of oil contained in the cells of seeds into the form suitable for further technological treatment. That is why we first ground 100 g of plum kernels on a laboratory mill LZMK-1. Crushed mass of kernels was obtained from the plum stones by comminuting them as finely as to achieve the undersize of 90–95 % for a screen with 1 mm meshes. In the course of processing the stones, it is practical to apply wet-heat treatment to the crushed kernels before they enter the press: by this, we overcome or weaken noticeably the forces that bind oil with the upper parts of the crushed kernels, and facilitate its separation from the oil-free components. 100 g of the crushed kernels prepared for the pressing had been preliminarily subjected to wet-heat treatment in a water bath. The sample was put on a 5 mm sieve, with spunbond material laid in, and placed on the bath under a lid with a hole for a thermometer, to monitor the temperature and duration of saturation of the crushed kernels with steam. For a certain variety of crushed plum kernels, the temperature conditions and duration of filling the pores with oil were determined. The degree of filling the pores in the crushed kernels was determined as a percentage by pressing the mass on a press under three operating modes, with the temperature ranging 40 to 60 °C and the process duration 10 to 20 min. The processed mass of crushed kernels was put on a manual press PROM-1U on the bottom of the operating cylinder in a layer as thick as 10–20 mm and slightly rammed down with a press punch. The oil yield was determined as a percentage of the maximum oil content in plum kernels. By raising the rod of the jack to the upper position, we create the pressure P=0.063 mPa in the cylinder with the product placed below the punch, which is enough for the oil pressing. The sufficiency of the effort applied is controlled by appearing oil. Throughout the time of applying this pressure, one should give the press handle 3–5 pushes more. If necessary, the sample is precompacted, then some more material to be pressed is added, and this is followed by further pressing. On completion of oil pressing, the rod of the jack is returned to the lower position. The product (press cake) is taken out of the cylinder, and the oil that has run down into a preweighed flask is weighed. Thus we obtain the data on how much the pores in the crushed material are filled with oil.

The pulpy mash obtained as a result of the wet-heat treatment of crushed kernels was pressed using a laboratory hydraulic press of the U1 EPM type. 100 g of the mash was poured into the press container and 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 three operating modes of pressing, the parameters considered were the temperature (30–50 °C), the rate of load application (5–15 kN/cm), the compressive strength (10–20 kN), and the load resistance time (10–20 min). As the pressure decreased, it continued to be raised to the maximum using the hand pump. During the pressure augmentation, particles of the pulpy mash stick together into a block, the density of the press cake increases, and the oil pressing stops. The thickness of the resulting oilcake piece was measured in millimetres. The oil, after it has flowed down into a preweighed flask, is weighed, and thus we obtain the data on its yield as a percentage.

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2.3. The mass fraction of moisture in the crushed material was measured by the rapid drying method or using an electrical moisture meter according to DSTU ISO 771:2006. *Oilcake and oilseed meal. Determining the content of moisture and volatile substances* (ISO 771:1977, IDT).

2.4. The thickness of a plum oilcake piece was measured in order to monitor daily the operation of the press, and also, when testing new makes of presses.

2.5. The smell, taste, colour, and transparency of the oil from the kernels of stones of different plum varieties were determined according to DSTU 8842:2019. *Oils. Methods of determining the smell, taste, colour, and transparency*.

2.6. All numerical data obtained were processed using Excel from the Microsoft Office 2007 service software package. The numerical data were presented in the form of the arithmetic mean and the standard deviation (M±m).

3. Results and Discussion

To produce pressed oil, the crushed kernels were wet-heat treated on a water bath (Fig. 1) and at the same time underwent pressing on the press (Fig. 2). The pressing process was carried out in steps, with certain pressure maintained and duration observed. Table 1 shows the operating conditions of the wet-heat treatment and pressing.

Fig. 1. Wetting the crushed kernels

Fig. 2. Pressing

Table 1. Operating conditions of the wet-heat treatment and pressing

Parameter	Plum cultivars			
	Friar	President	Greengage	Uhorka
Wet-heat treatment				
Duration, min	10–15		15–18	
Temperature, °C	40–50		45–55	
Pressing				
Rate of load application, KN / cm	5.0		4.5	
Compressive strength, KN	10		10	
Load resistance time, min	3.0–8.0		5.0–8.0	
Temperature, °C	50–60		55–65	

After purification, the raw material goes through the cracking stage, when the kernel is separated from the shell, followed by comminuting in a laboratory mill. At least 90–95 % of the ground material should be as fine as the undersize from a screen with 1 mm meshes.

During the processing, the crushed material, before entering the press, was moisturized with steam. To overcome and weaken the forces that bind oil with the surfaces of the kernels crushed, and to facilitate its separation from the oil-free components, the processed material undergoes wet-heat treatment. It consists in treating the crushed kernels with hot vapour, which is accompanied by intensive stirring, to obtain a sufficiently heated and moisturized product termed mash. The temperature and duration of the wet-heat treatment of the kernels were as follows: for the cultivars Friar and President – 40–50 °C, τ 10–15 min, followed by pressing at 50–60 °C for 3–8 min; for the cultivars Greengage and Uhorka – 45–55 °C, τ 15–18 min, followed by pressing at 55–65 °C for 5–8 min.

After this treatment, the mash enters the press for the final removal of oil. This is an element of the manufacturing line where oil is recovered from kernels by cold pressing.

Oil pressed out of plum kernels contains quite a number of suspended particles, in particular, those of minerals. It is cleared of mechanical impurities by their sedimentation. Then it can be stored

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or used for further purposes. In Fig. 3, you can see the press cake and oil recovered from the kernels of plum stones.

Fig. 3. Press cake and oil recovered from the kernels of plum stones

3.1. Determining the thickness of the oilcake piece

The thickness of an oilcake piece is a major indicator of the operation of a press. The determining of this parameter allows monitoring daily the operation of a press, and is necessary when testing new makes of presses.

The values of the thickness of oilcake pieces in the samples analysed are presented in Fig. 4.

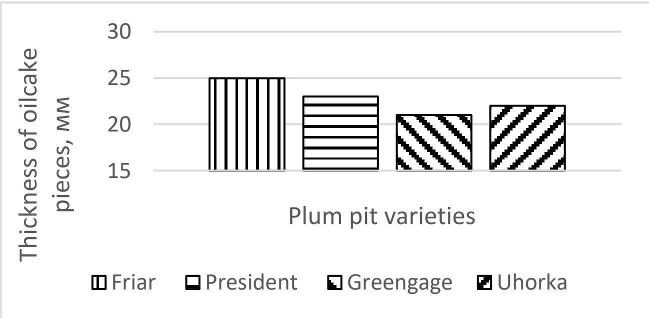

Fig. 4. Thickness of oilcake pieces, mm

The oilcake piece was the thinnest in the cultivar Greengage (21 mm), and the thickest in the cultivar Friar (25 mm). The data obtained are positive and prove the high performance of the operating modes used. The oilcake can be used as animal feed, as a raw material for activated carbon, as fertilizer, or in the form of dietary supplements.

3.2. Determining the sensory characteristics

The sensory characteristics were determined on a five-point scale. The parameters rated were the appearance, smell, consistency, taste, and colour. Fig. 5 shows the profilogram of the sensory parameters of plum-kernel oils from the plum varieties Friar, President, Greengage, and Uhorka.

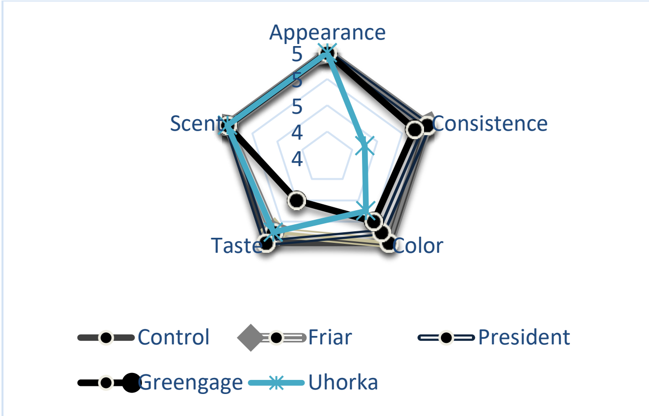

Fig. 5. Profilogram of the sensory characteristics of plum-kernel oils

From Fig. 5 and 6, one can see the score of each parameter of the oil and oilcake from kernels of a certain plum variety. In all the samples, the appearance and smell received 5 points. Almost the same was the score of the colour and consistency in all the cultivars. However, the taste characteristics differed significantly. The lowest score was that of the oil and oilcake from the cultivar Uhorka, because its oil had a bitterish shade of taste.

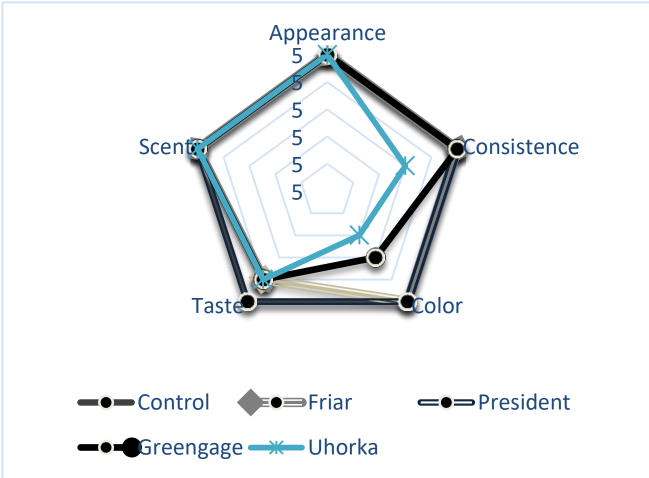

Fig. 6. Profilogram of the sensory characteristics of plum-kernel oilcake

The review of literature makes it clear that obtaining oil and oilcake from various plum cultivars is a topical task. This makes the manufacture of these products so promising a direction.

4. Conclusions

The operating modes have been improved, with the introduction of wet-heat treatment. When processed, the crushed plum kernels were moisturized with steam before they entered the press. To overcome or weaken the forces that bind oil with the upper parts of the crushed kernels, and to facilitate its separation from the oil-free components, we use wet-heat treatment. This process consists in treating the crushed kernels with hot vapour, which is accompanied by intensive stirring, to obtain a sufficiently heated and moisturized product called mash. The temperature and duration of the wet-heat treatment of the kernels were as follows: for the cultivars Friar and President – 40–50 °C, τ 10–15 min, followed by pressing at 50–60 °C for 3–8 min; for the cultivars Greengage and Uhorka – 45–55 °C, τ 15–18 min, followed by pressing at 55–65 °C for 5–8 min.

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References

1. Amah, U.J., Okogeri, O. (2019). Nutritional and Phytochemical Properties of Wild Black Plum (Vitex doniana) Seed from Ebonyi State. International journal of Horticulture. Agriculture and Food science (IJHAF), vol. 3(1), pp. 1–2. https://aipublications.com/uploads/issue_files/5-IJHAF-FEB-2019-5-Nutritionaland.pdf
2. Anwar, F., Manzoor, M., Bukhari, I.H., Aladedunye, F. (2014). Physico-chemical attributes of fruit seed oils from different varieties of peach and plum. J. Adv. Biol., vol. 4, pp. 385–390. [Google Scholar]
3. Aporta, A., Catalán, E., Galán-Malo, P., Ramírez-Labrada, A., Pérez, M., et al. (2014). Granulysin induces apoptotic cell death and cleavage of the autophagy regulator Atg5 in human hematological tumors. Biochemical Pharmacology, vol. 87(3), pp. 410–423.
4. Bolarinwa, I.F., Morgan, C.R. (2014). Amygdalin content of seeds, kernels and food products commercially-available in the UK. Food Chemistry, vol. 152, pp. 133–139.
5. Chun, O.K., Kim, D.O. (2004). Consideration on equivalent chemicals in total phenolic assay of chlorogenic acid-rich plums. Food Research International, vol. 37, pp. 337–342.
6. Frohne, D., Pfander, H.J. (2005). A handbook for doctors, pharmacists, toxicologists, biologists, and veterinarians, 2nd ed., Timber Press, London, p. 338.
7. Górnaś, P., Mišina, I., Grāvīte, I., Lācis, G., Radenkovs, V., et al. (2015). Composition of tocochromanols in the kernels recovered from plum pits: the impact of the varieties and species on the potential utility value for industrial application. European Food Research and Technology, vol. 241, pp. 513–520. DOI:10.1007/s00217-015-2480-4
8. Górnaś, P., Rudzinska, M., Raczyk, M., Misina, I., Soliven, A., et al. (2016). Impact of species and variety on concentrations of minor lipophilic bioactive compounds in oils recovered from plum kernels. J. Agric. Food Chem., vol. 64, pp. 898–905. [Google Scholar] [CrossRef] [PubMed]
9. Hassanein M.M.M. (1999). Studies on non-traditional oils: l. Detailed studies on different lipid profiles of some Rosaceae ker-nel oils. Grasas Aceites, vol. 50, pp. 379–38422.
10. Kristl, J., Slekovec, M., Tojnko, S., Unuk, T. (2011). Extractable antioxidants and non-extractable phenolics in the total antioxidant activity of selected plum cultivars (Prunus domestica L.): Evolution during on-tree ripening. Food Chemistry, vol. 125, pp. 29–34.
11. Khallouki, F., Haubner, R., Erben, G.C., Ulrich, M., Owen, R.W. (2012). Phytochemical composition and antioxidant capacity of various botanical parts of the fruits of Prunus × domestica L. from the Lorraine region of Europe. Food Chemistry, vol. 133, pp. 697–706.
12. Kiralan, M., Kayahan, M., Kiralan, S.S., Ramadan, M.F. (2018). Effect of thermal and photo oxidation on the stability of cold-pressed plum and apricot kernel oils. Eur. Food Res. Technol, vol. 244, pp. 31–42. [Google Scholar] [CrossRef]
13. Matthaeus, B., Özcan, M.M. (2009). Fatty acids and tocopherol con-tents of some Prunus spp. Kernel oils. J Food Lipids, vol. 16, pp. 187–19923.
14. Mišić, P.D. (2006). Šljiva (in Serbian), 2nd edn. Belgrade: Partenon.
15. Picuric-Jovanovic, K., Vrbaski, Z., Milovanovic, M. (1997). Aqueous-enzymatic extraction of plum kernel oil. Lipid/Fett, vol. 99, pp. 433–443.
16. Redondo, D., Arias, E., Oria, R., Venturini, M.E. (2017). Thinned Stone Fruits Are a Source of Polyphenols and Antioxidant Compounds. J. Sci. Food Agric, vol. 97, pp. 902–910. doi: 10.1002/jsfa.7813. [Google Scholar] [CrossRef] [PubMed]
17. Rop, O., Jurikova, T., Mlcek, J., Kramarova, D., Sengee, Z. (2009). Antioxidant activity and selected nutritional values of plums (Prunus domestica L.) typical of the White Carpathian Mountains. Scientia Horticulturae, vol.122, pp. 545 –549.
18. Kumar, S.P.J., Prasad, S.R., Banerjee, R., Agarwal, D.K., Kulkarni, K.S., et al. (2017). Green Solvents and Technologies for Oil Extraction from Oilseeds. Chem. Cent. J., vol. 11, p. 9. [Google Scholar] [CrossRef] [PubMed]
19. Shukla, R.K., Prajapati, K., Shukla, A., Singh, R. (2021). Evaluation of Nutritive Value, Phytochemical Screening, Total Phenolic Content and in-Vitro Antioxidant Activity of the Seed of Prunus domestica L. Plant Sci. Today, vol. 8, pp. 830–835. [Google Scholar] [CrossRef]
20. Usenik, V., Kastelec, D., Veberič, R.F. (2008). Štampar, Quality changes during ripening of plums (Prunus domestica L.). Food Chemistry, vol. 111, pp. 830–836.
21. Usenik, V., Štampar, F., Veberič, R. (2009). Anthocyanins and fruit colour in plums (Prunus domestica L.) during ripening, Food Chemistry, vol. 114, pp. 529–534.

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