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Original research paper

CHANGES IN BIOACTIVE COMPOUNDS' STABILITY AND COLOUR OF FUNCTIONAL PLUM SPREAD DURING DIFFERENT STORAGE CONDITIONS

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Abstract: There is growing interest in utilizing juice pomace, including plum pomace, in new food products as a sustainable strategy for reducing agro-waste. As an alternative source of dietary fibres and phenolic bioactives, plum pomace represents a valuable ingredient in functional food development. Some phenolics, such as anthocyanins are more sensitive and susceptible to degradation processes in fruit preparation during storage. This study aimed to assess the effect of a storage period and temperature on the retention of phenolics, anthocyanins (total and monomeric) and the colour of functional plum spread enriched with plum pomace. The spreads were stored at 4°C (14 days) and 20°C or 40°C for 14, 28 and 45 days. The control sample was also analysed one day after production and measurements for investigated spreads were compared. Results revealed that total phenolics remained more stable than total anthocyanins and monomeric anthocyanins at room temperature, while a temperature of 40°C led to the loss of all bioactives. Refrigeration of spread was found to significantly slow down the loss of phenolics and anthocyanins and better preserve colour. Colour deterioration was observed in all samples, with the least change at 4°C.

Key words: *functional plum spread, plum pomace, phenolic bioactive compounds, anthocyanins, colour, storage conditions*

INTRODUCTION

Serbia was the third-largest plum producer in the world in 2022, according to the Food and Agriculture Organization (FAO) (FAOSTAT, 2022). Plums (*Prunus domestica* L.) are classified as climacteric fruits, characterized by an intensive respiration rate and ethylene production after harvesting, which leads to fruit softening and decay during storage. Various pre- and post-harvest treatments can prolong the shelf life of plums (Ozturk, Kucuker, Karaman & Ozkan, 2012; Díaz-Mula et al., 2011; Manganaris, Vicente, & Crisosto, 2008). However, fresh plums are available only from summer to early autumn, depending on the variety. Therefore, plums must be processed into various commercial products (frozen plums, jam, marmalade, traditional products like *pekmez*, alcoholic drink *rakija*, juice, etc.).

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Plum processing in Serbia is relatively limited compared to the USA, Germany, and the UK, where a significant portion of plums is processed into numerous products even though these countries also import plums (Matković, 2015; Lukač Bulatović, Rajić & Ljubanović Raljević, 2012).

The growing demand for functional foods has highlighted the need to develop low- and reduced-calorie fruit products that retain beneficial bioactive compounds, such as spreads, which offer nutritional and sensory qualities similar to fresh fruit (Peinado, Rosa, Heredia & Andrés, 2015). This trend emphasizes the importance of valorising the food industry by-products such as juice pomace, which are rich in dietary fibres, bioactive compounds, and other valuable constituents (Comunian, Silva & Souza, 2021). The plum juice industry produces approximately 20% pomace (Sójka et al., 2015; Levaj et al., 2012), which can be a source of dietary fibres (up to 49% in dry matter) and phenolic compounds. Phenolic bioactives in plum pomace exhibit antioxidant and bacteriostatic effects, indicating their potential as natural preservatives (Basanta et al., 2018; Sójka et al., 2015; Milala et al., 2013). Anthocyanins from dark-coloured plum pomace can serve as natural colourants in food (Basanta et al., 2018), while dietary fibres can act as rheology modifiers, water and oil binding agents, and gelling agents (Rosell, Santos & Collar, 2009; Dikeman & Fahey, 2006). The phenolics and fibres contribute to both technological functionality in foods and health benefits, including the potential prevention of chronic diseases like cancer and cardiovascular diseases (Mzoughi, Demircan, Turan, Firatligil & Ozcelik, 2023; Milala et al., 2013; Stacewicz-Sapuntzakis, Bowen, Hussain, Damayanti-Wood & Farsnworth, 2001). Insoluble dietary fibres from plums enhance intestinal peristalsis and prevent constipation, reducing the risk of colon cancer (Stacewicz-Sapuntzakis, 2013). Soluble dietary fibres lower LDL cholesterol levels and promote bowel movement, supporting the development of beneficial intestinal microflora (Milala et al., 2013; Dikeman & Fahey, 2006; Stacewicz-Sapuntzakis et al., 2001). Furthermore, the independent or synergistic effects of plum phytochemicals (phenols, carotenoids, vitamins, etc.) and minerals are effective in combating obesity, diabetes, osteoporosis, cardiovascular diseases, and certain types of cancer (such as breast cancer) (Stacewicz-Sapuntzakis et al., 2013; Hooshmand & Arjmandi, 2009).

Integration of plum pomace into food structures might be a sustainable solution for reducing waste material and utilizing its functional potential. Our previous research focused on optimizing plum spread formulation using lyophilized plum pomace to achieve the ideal texture, colour, and phenolic antioxidant content (Bajić et al., 2020). This product, made with dried pomace, exhibits higher total monomeric anthocyanins (TMA) compared to standard plum jams (Bajić et al., 2020). Utilizing native plum pomace in the plum spread can also enhance the content of phenolic compounds, particularly anthocyanins, which accumulate in the skin of the plum. By reducing sugar additions and increasing beneficial compounds from pomace (such as phenolics and dietary fibres), a functional spread can be created.

However, given that phenolic compounds in fruit jams are prone to degradation during storage, with anthocyanins being particularly sensitive (Holzwarth, Korhummel, Siekmann, Carle & Kammerer, 2013), further experiments are needed to investigate and enhance the stability of these bioactive compounds in such preparations. Retention of phenolic compounds in fruit preparations, such as jams, depends on their composition, including sugar, acid, and pectin content (Mohammadi-Moghaddam, Firoozzare, Daryadar & Rahmani, 2020; Shinwari & Rao, 2018; Kopjar, Piližota, Tiban & Šubarić, 2009; Poiana, Munteanu, Bordean, Gligor & Alexa, 2013). Higher sugar concentrations in standard jams increase anthocyanin stability by reducing water activity (Kopjar et al., 2009), but this effect is reversed in low- or reduced-calorie jams due to furfural formation in acidic conditions and at lower sugar levels (Shinwari & Rao, 2018). Additionally, the degradation of anthocyanins, which are natural pigments, may negatively affect the desirable, attractive colour of the jam (Banaś, Korus & Korus, 2018; Poiana, Alexa & Mateescu, 2012). Colour is a crucial sensory attribute in assessing jam quality, as it is the first characteristic perceived by consumers during purchase (Banaś et al., 2018; Pestorić, 2016). Therefore, achieving the desired and expected appearance during fruit processing is a major goal for producers. Furthermore, the colour of the jam can signal freshness or potential

spoilage, as well as indicate the transformation of pigments due to degradation during production and storage (Banaś et al., 2018; Poiana et al., 2012). Retention of thermolabile natural pigments during preparation and storage is crucial for maintaining jam colour and consumer acceptability (Wang, Zhang & Wu, 2015; Poiana et al., 2012).

This study aimed to investigate the retention of phenolic compounds, anthocyanins, and colour in a functional plum spread fortified with native plum pomace under various storage conditions (at refrigerator temperature for 14 days and at 20 or 40 °C for 14, 28, and 45 days). Additionally, sugars and total acids were determined in all samples.

MATERIALS AND METHODS

Functional spread preparation

Plums (*Prunus domestica*) were washed, deseeded, and processed into plum purée and plum pomace. The plums used for purée were homogenized (MCM4100GB, BOSCH, Germany), boiled for 5 minutes, then frozen and stored at -20 °C. Plum pomace was obtained after juice extraction using a manual fruit press and was subsequently frozen in thin layers at -20 °C. Pilot-scale production of the functional spread (FS) was conducted using a vacuum cooker (Compconsult, Niš, Serbia) operating at 0.9 bars and reaching 50 °C, according to the formulation presented in Table 1. The formulation included 1% LM pectin (Vinipex d.o.o, Serbia) and approximately 0.1% calcium as $CaCl_2 \times 2H_2O$ to ensure gelling at low total soluble solids (TSS). Citric acid was added to adjust the pH to approximately 3.0, within the recommended range of 3.0-3.6 (Vinipex d.o.o). The spread was prepared with 1350 g of fruit per 1000 g of the final product, and cooking was completed at 32 °Brix. The spread was transferred to glass jars (370 ml) and pasteurized (1h, 85 °C). Total phenolic content (TPC), total anthocyanins (TA), and total monomeric anthocyanins (TMA) were measured in the new product immediately after preparation, and identified as the control spread (FS control_1D). To preserve the pigments and colour, the spread was stored at 4 °C, and the retention of phenolic compounds was monitored after 14 days. To accelerate the degradation of phenolics, higher temperatures (20 °C and 45 °C) were applied, and TPC, TA, and TMA were analysed after 14, 28, and 45 days of storage.

Analysis of sugars

Determination of sugar composition in plum samples was performed by high-performance liquid chromatography (HPLC), according to the methods previously described in Milenković et al. (2020) with some modifications. An aliquot of about 1 g was dissolved in 30 ml of demineralized water and roughly shaken for 1 min. For sugars analysis, acetonitrile/water system (65:35, v/v) was used as the mobile phase, and the total run time was 15 min.

Total acids

Total acids in samples were analysed according to the Association Official of Analytical Chemists (AOAC International, 2000) method 925.53. The result was expressed as malic acid (g MAE/100 g of plum product).

Total phenolic content determination

The extract was prepared using a two-step extraction procedure explained in Ilić et al. (2020) with some modifications.

Table 1.
Formulation of functional plum spread (FS)

Functional spread (FS)	
Ingredients	**w (m/m; %)**
Plum purée	75
Plum pomace	10
Citric acid	0.5
Ascorbic acid	0.04
Sugar	7
LM pectin	1
$CaCl_2 \times 2H_2O$	0.08
H_2O	6.38

LM pectin – Low methoxyl pectin

Aliquots of approximately 2.0 g of the spreads were homogenized with 20 ml of methanol/H_2O (50:50, v/v) using an orbital shaker (300 rpm, 1 hour).

The supernatant was collected after centrifugation (10,000 rpm, 5 minutes). The residue was then homogenized with acetone/H_2O (70:30, v/v), following the same steps as described in the first step. The final extract was prepared by combining both supernatants in a 50 ml volumetric glass flask and filling it up to the mark with a mixture of solvents (methanol/acetone/H_2O; 25/35/40). TPC was determined spectrophotometrically (Cintra 303, GBC Scientific Equipment, Australia) according to the Folin–Ciocalteu method described by Singleton, Orhofer and Lamuela-Raventos (1999). Absorbance was recorded at 730 nm and gallic acid was used as a standard. Results were expressed as mg of gallic acid equivalents per 100 g of plum spread (mg GAE/100 g).

Anthocyanins analysis

Total anthocyanins (TA) and total monomeric anthocyanins (TMA) in spreads were extracted with acidified methanol (0.1% HCl) and determined spectrophotometrically (Cintra 303, GBC Scientific Equipment, Braeside, VIC, Australia) following pH differential procedure described in Barać et al. (2022). Results for both TA and TMA were expressed as mg of cyanidin 3-glucoside equivalents per 100 g of plum spread (mg CGE/100 g).

Colour determination

The colour properties of spreads were analyzed using a MINOLTA Chroma Meter CR-400 (Konica Minolta Sensing Inc., Japan) equipped with a CR-A33f, in the CIELCH color space. The hue angle (h*) and the degree of colour saturation, chroma (C*) were calculated as described in Bajić et al. (2020). The total colour change (ΔE) in comparison to the control sample (FS control_1D) was determined to detect visible colour difference after storage following the criteria in Pestorić (2016). The total colour change was calculated according to the following equation:

$$\Delta \boldsymbol{E} = \sqrt{(\boldsymbol{\Delta L^*})^2 + (\boldsymbol{\Delta a^*})^2 + (\boldsymbol{\Delta b^*})^2} \qquad (1)$$

ΔL^* - changes in lightness

Δa^* - changes in redness/greenness

Δb^* - changes in yellowness/blueness

Statistical Analysis

Results were expressed as the mean values ± standard deviation. Statistical significance was determined using one-way ANOVA ($\alpha = 0.05$), followed by Tukey's HSD test, performed with STATISTICA 13.1 (TIBCO Software Inc., Hillview Avenue, Palo Alto, CA, USA).

RESULTS AND DISCUSSION

Individual sugars and total acids in the plum spreads

The results for individual and total sugars are shown in Fig. 1. Fructose and glucose content significantly increased, while sucrose content significantly decreased in all samples compared to the control, regardless of storage conditions ($p<0.05$). Total sugars did not change after storage at 4 °C for two weeks (25 g/100 g), despite differences in individual sugars (between FS control_1D and FS 4°_14D). Storing the functional spread at room and elevated temperatures (20 °C and 40 °C) led to a significant increase in total sugars ($p<0.05$) across all samples, ranging from 30.63 to 34.02 g/100 g. Fructose and sucrose levels remained unchanged among samples, while glucose increased in all samples compared to the control (Fig. 1).

Total acids did not differ significantly among all investigated spreads and ranged from 1.51 to 1.61 g malic acid/100 g. This was consistent with Culetu, Manolache and Duta (2014), who reported total acid concentrations ranging from 0.84% to 2.32% in traditional sugar-free plum jams.

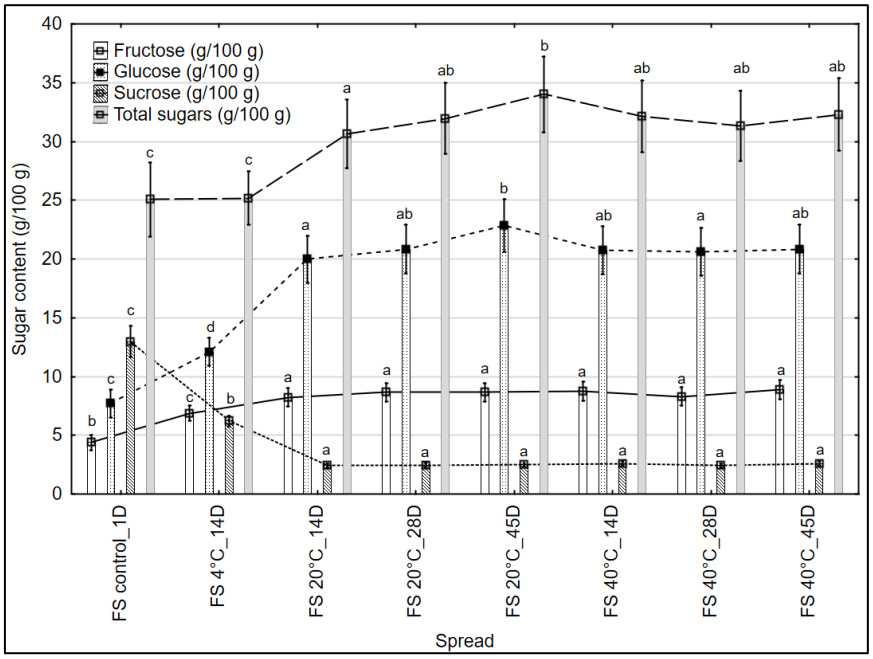
The results of the TPC analysis in the samples are shown in Table 2, while the rate of TPC change relative to the control sample (FS control_1D) is depicted in Fig. 2. The change in bioactive compounds in jams and jellies may continue during storage depending on the conditions, with storage temperature and duration having a significant effect (Shinwari & Rao, 2018). In the control sample, TPC amounted to 236.91 ± 3.34 mg GAE/100 g, with no significant difference ($p>0.05$) compared to spreads stored under refrigerated conditions for two weeks and at room temperature (20 °C) regardless of the storage period (14, 28, and 45 days). Conversely, the total phenolic content (TPC) in spreads stored at 40 °C degraded over the 45-day storage period, showing a statistically significant difference

($p<0.05$) compared to other samples (Table 2). Conversely, the total phenolic content (TPC) in spreads stored at 40 °C degraded over the 45-day storage period, showing a statistically significant difference ($p<0.05$) compared to other samples (Table 2).

This degradation is illustrated in Fig. 2, where TPC decreased by 5%, 12%, and 21% in samples stored at 40 °C for 14, 28, and 45 days, respectively (FS 40 °C_14D, FS 40 °C_28D, and FS 40 °C_45D).

The total phenolic content (TPC) exhibited a declining trend during storage, with a more pronounced effect observed at higher temperatures. This effect was evident when comparing samples stored for the same duration at 20 °C and 40 °C (Fig. 2). TPCs in spreads stored at 4 or 20 °C were slightly (1-3%) increased compared to the control (Fig. 2), although the difference was not significant (Table 2).

Thus, TPC was stable for 6 weeks in plum spread at room temperature. Contrary to our findings, the total phenolic content (TPC) in a low-calorie strawberry jam degraded at both room temperature and 4 °C (Kopjar et al., 2009).



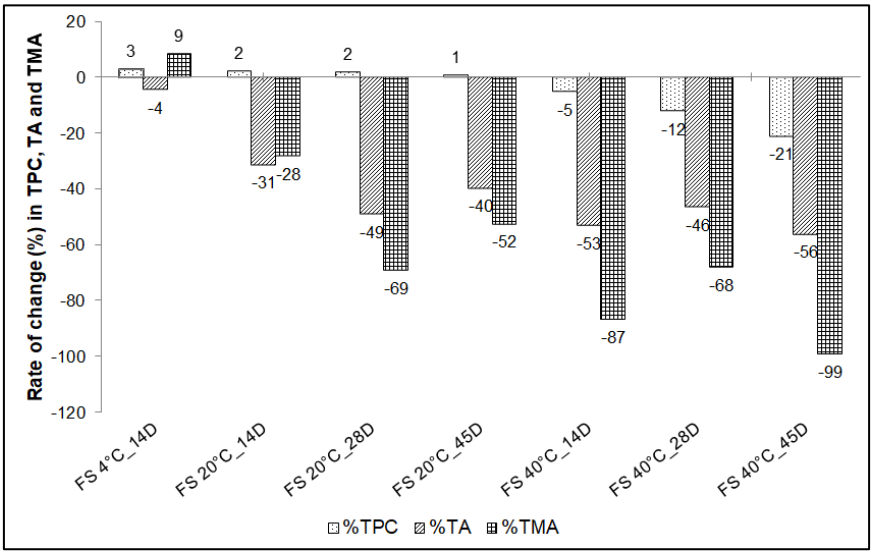
Results are expressed as means (n = 3) ± standard deviations. Different lowercase letters above the bars in the same colour indicate a statistically significant difference at p < 0.05

Figure 1. Content of individual and total sugars in functional plum spreads during storage at 4 °C, 20 °C and 40 °C

Table 2.
Total phenolic content (TPC) in functional plum spread

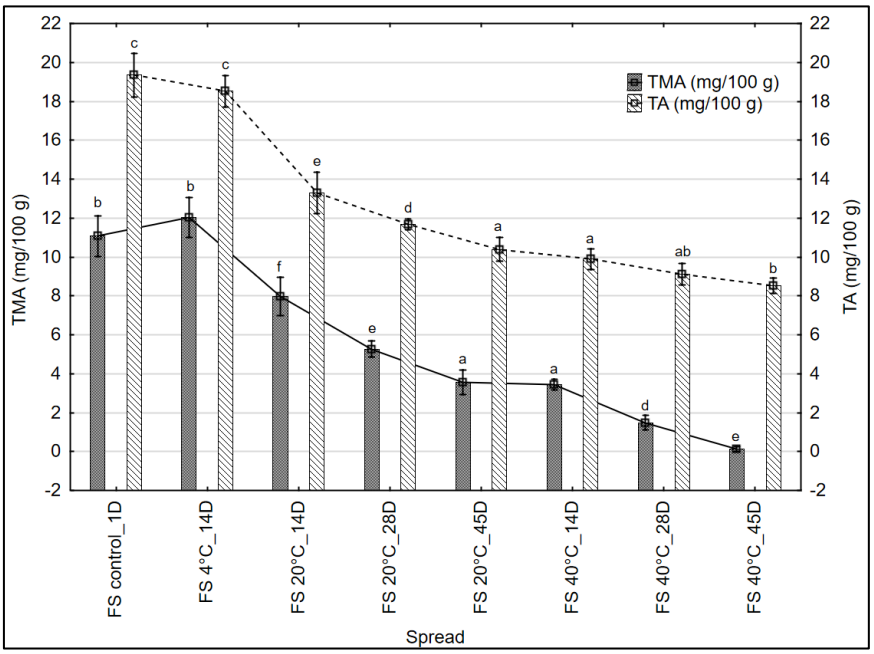
Spread	TPC (mg GAE/100 g)
FS control_1D	236.91 ± 3.34[a]
FS 4 °C_14D	243.89 ± 5.71[a]
FS 20 °C_14D	242.04 ± 7.11[a]
FS 20 °C_28D	241.11 ± 8.89[a]
FS 20 °C_45D	238.61 ± 8.57[a]
FS 40 °C_14D	229.95 ± 3.69[d]
FS 40 °C_28D	208.32 ± 5.82[c]
FS 40 °C_45D	187.35 ± 5.85[b]

Results are expressed as means (n = 6) ± standard deviations. Different lowercase letters within a column indicate statistically significant difference at p < 0.05



TPC – total phenolic content (mg GAE/100 g), TA – total anthocyanins (mg CGE/100 g), TMA – total monomeric anthocyanins (mg CGE/100 g); FS – functional spread; D – days of storage

Figure 2. Rate of change (%) in TPC, TA and TMA during storage



TA – total anthocyanins (mg CGE/100 g), TMA – total monomeric anthocyanins (mg CGE/100 g); FS – functional spread; D – days of storage. Results are expressed as means (n = 6) ± standard deviations. Different lowercase letters above the bars in the same colour indicate a statistically significant difference at p < 0.05.

Figure 3. Change of total anthocyanins (TA) and total monomeric anthocyanins (TMA) in functional plum spreads during storage at 4, 20 and 40 °C

The comprehensive study conducted by Shinwari & Rao (2018) showed that bioactive compounds in high- and reduced-fruit jams are better preserved at refrigeration temperatures compared to room temperature during storage periods of up to 6 or 9 months. TPC was more stable at room temperature in this study, while anthocyanin retention was observed only at 4 °C. The TA and TMA in the control plum spread and the spread stored for two weeks in the refrigerator were not significantly different ($p>0.05$) (Fig. 3). This finding aligns with the results of Kamiloglu, Pasli, Ozcelik, Van Camp and Capanoglu (2015), who observed

better anthocyanin retention in black carrot jam stored at 4 °C compared to room temperature. However, elevated temperatures led to a statistically significant degradation of both parameters in FS 20 °C_14D and FS 40 °C_14D. It is evident that both total anthocyanins (TA) and total monomeric anthocyanins (TMA) decreased during storage from 14 to 45 days at both 20 °C and 40 °C, with more pronounced losses observed at the higher temperature (Fig. 2). Monomeric anthocyanins decreased by 28-69% and 68-99% in the spread samples stored at 20 and 40 °C, respectively, compared to the control sample (Fig. 2). The loss of TA in processed blueberry products after six months of storage at 25 °C was severe, reaching 62-85% (Brownmiller, Howard & Prior, 2008). Differences in the degradation kinetics of plum phenolic compounds might reflect this observation (Turturică, Stănciuc, Bahrim & Râpeanu, 2016). The loss of TA and TMA in samples at 20 and 40 °C might be attributed to changes in individual sugars, as sucrose decreased while both monosaccharides increased (Table 1). Moldovan and David (2020) reported that sucrose had a positive effect on the stability of anthocyanins in cherry juice compared to fructose and artificial sweeteners. Additionally, anthocyanins are less stable in reduced-calorie jams, as lower sugar levels lead to furfural formation, which accelerates anthocyanin degradation (Shinwari & Rao, 2018). Furfural, an indicator of the Maillard reaction in processed foods, is derived from ascorbic acid during thermal exposure or storage, and also from the degradation of sugars (Mesías-García, Guerra-Hernández & Garcia-Villanova, 2010). Consequently, ascorbic acid can be identified as a precursor in the Maillard reaction. Additionally, 5-hydroxymethylfurfural (HMF) serves as an ideal indicator of thermal treatment in fruit-based foods due to sugar degradation favoured by the Maillard reaction and the lower pH (<4) (Mesías-García et al., 2010). Similarly, in our study, the degradation of sucrose led to the formation of reducing sugars (Table 1), which, together with the naturally occurring amino acids in the fruit spread, serve as potential precursors for the Maillard reaction.

Colour of plum spreads

The degradation of anthocyanins in spread reflects also the final product colour since anthocyanins are pigments responsible for the colour of plum spread (Turturică et al., 2016).

Anthocyanins and colour were stable in the sample stored at 4 °C for 14 days since saturation and hue angle (C* and h*, respectively) did not change significantly during storage (Table 3). On the other hand, lightness expressed as L* increased significantly after storage, regardless of the applied storage conditions, compared to the control sample ($p < 0.05$).

When stored at temperatures higher than 4 °C, the h° angle significantly increased (18.27 – 30.81), indicating that the red-coloured spread developed slightly yellow tones. The difference was more significant when spread was stored at 40 °C (Table 3). Colour saturation expressed as C*, significantly decreased in all samples stored at 20 and 40 °C when compared to control spread and stored in refrigerating conditions. This is an indicator of a less vivid red colour in spreads. Similar to h*, the parameter C* was more affected by storage at 40 °C (compared to 4 °C). The ΔE values for the samples FS 4 C_14D, FS 20 °C_14D, and FS 20 °C_45D were more noticeable to the human eye ($3 < \Delta E < 6$) (Pestorić, 2016).

Table 3.
Colour properties of functional plum spread during storage at different temperatures (4 °C, 20 °C and 40 °C)

Spread	L*	C*	h*	ΔE
FS control_1D	21.85 ± 0.24^{b}	19.67 ± 0.68^{e}	12.73 ± 0.88^{c}	0.00
FS 4 °C_14D	24.80 ± 1.29^{a}	19.08 ± 0.61^{e}	11.94 ± 0.75^{c}	3.03
FS 20 °C_14D	25.53 ± 0.12^{a}	16.74 ± 0.20^{d}	18.27 ± 1.59^{d}	5.03
FS 20 °C_28D	24.75 ± 0.10^{a}	$14.16 \pm 0.10^{a,b}$	25.95 ± 1.38^{a}	7.98
FS 20 °C_45D	25.35 ± 0.66^{a}	$15.25 \pm 0.22^{b,d}$	20.56 ± 1.05^{d}	5.78
FS 40 °C_14D	26.16 ± 0.27^{a}	11.76 ± 0.56^{c}	30.81 ± 2.04^{b}	10.32
FS 40 °C_28D	26.42 ± 1.11^{a}	$13.82 \pm 0.89^{a,b}$	$27.30 \pm 0.46^{a,b}$	8.00
FS 40 °C_45D	25.18 ± 1.06^{a}	$13.05 \pm 0.74^{a,c}$	$29.22 \pm 1.73^{a,b}$	8.71

L - lightness, C* – colour saturation, h – hue angle, ΔE – total colour change, FS – functional spread; D – days of storage*

However, the other samples showed higher ΔE values (>6), indicating that the difference is significant and may impact the acceptability of the spread colour. This finding aligns with previous results for fruit jams, where both HMF and total colour difference (ΔE) values increased linearly with storage time, with higher values recorded at elevated storage temperatures (Aslanova et al., 2010).

CONCLUSIONS

This study examined the stability of key bioactive components—total phenolic content (TPC), total anthocyanins (TA), and total monomeric anthocyanins (TMA)—as well as the colour of functional plum spreads made with plum pomace, with a focus on the effects of storage duration and temperature. Our findings indicate that the stability of these components is largely dependent on storage conditions and may also be affected by sugar composition, particularly in relation to anthocyanins and colour.

TPC remained stable at 4 °C and 20 °C throughout the investigated storage period, with a slight increase (1-3%). Similarly, TMA increased at 4 °C after two weeks of storage, while TA decreased by 4% under the same conditions. Increasing temperature and storage duration (14 or 45 days) had a negative impact on both TA and TMA. At 20 °C, the reduction in TA and TMA ranged from 31% to 49% and 28% to 69%, respectively. A similar trend was observed at 45 °C for all investigated phenolic bioactives. TPC, TA, and TMA losses at 45 °C were 5-21%, 46-56%, and 68-99%, respectively. In brief, TPC was more stable compared to TA and TMA at room temperature. On the other hand, a temperature of 40 °C degrades all investigated bioactives.

Colour deterioration was observed in all samples, with the least change occurring when the spread was stored at 4 °C. Thus, storing the spreads under refrigeration may help reduce the loss of phenolics, anthocyanins, and consequently, colour. Therefore, suppliers and retailers are advised to adopt refrigerated storage conditions for fruit spreads and preparations, as this practice aids in preserving thermolabile bioactives. The benefits of retaining these valuable nutrients outweigh any potential costs, ultimately providing consumers who are conscious of their choices and willing to pay for nutritionally rich food.

AUTHOR CONTRIBUTIONS

Conceptualization, methodology, formal analysis, A.R.B; Investigation, A.R.B., R.M.K., B.R.C, and D.N.U.S. Writing-original draft preparation, A.R.B., Ma.Z.Dj. and Mi.Z.Dj; Writing-review and editing, B.R.C., D.M.D., Ma.Z.Dj. and Mi.Z.Dj; Supervision, J.S.M.

DATA AVAILABILITY STATEMENT

Data contained within the article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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STABILNOST BIOAKTIVNIH JEDINJENJA I BOJE U FUNKCIONALNOM NAMAZU OD ŠLJIVE PRI RAZLIČITIM USLOVIMA SKLADIŠTENJA

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Sažetak: Trop iz industrijske proizvodnje voćnog soka, uključujući trop šljive, budi veliko interesovanje kao nova sirovina u prehrambenim proizvodima, vodeći se strategijom održivog smanjenja agro-otpada. Kao alternativni izvor prehrambenih vlakana i fenolnih jedinjenja, trop šljive predstavlja vredan sastojak u razvoju funkcionalnih prehrambenih proizvoda. Pojedine klase fenolnih jedinjanja, poput antocijana su osetljivije i podložnije degradacionim procesima tokom skladištenja voćnih prerađevina. Cilj ovog rada jeste da ispita uticaj vremena i temperature skladištenja na održivost fenola, antocijana (ukupnih i monomernih) i boje funkcionalnog namaza od šljive obogaćenog tropom šljive. Namazi su skladišteni na 4 °C (14 dana) i na 20 ili 40 °C (tokom 14, 28 i 45 dana). Kontrolni uzorak je takođe podvrgnut analizama jedan dan nakon proizvodnje, a prikupljena merenja su upoređena. Dobijeni rezulatati su pokazali da su ukupni fenoli stabilniji na sobnoj temperaturi u poređenju sa ukupnim i monomernim antocijanima, dok je temperatura od 40 °C dovela do gubitaka svih bioaktivnih jedinjenja. Skladištenje namaza na 4 °C može značajno da uspori gubitak fenola i antocijana, kao i da utiče na bolje očuvanje boje. Gubitak boje je takođe uočen kod svih uzoraka, ali je najmanji uticaj bio na 4 °C.

Ključne reči: *funkcionalni namaz od šljive, trop šljive, bioakitvne fenolne komponente, antocijani, boja, uslovi skladištenja*

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