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Characteristics and Quality of Apricot Jam Supplemented with Papaya Fruit Pulp

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Abstract:

The current study's objective is to identify the apricot jam's gross chemical constitutes, anti-nutritional aspects (oxalates, tannins, phytates, saponins, and trypsin inhibitor), phenolic compounds, sensory and physicochemical characteristics (pH, titratable acidity, viscosity, reflective index, total soluble solids, reducing &total sugar, vitamin C, total carotenoids, and color parameters), and quality attributes when incorporated with papaya fruit pulp. The findings confirmed that the fiber, ash, fat, protein, and energy values of the apricot and papaya fruit pulp as percentages of wet weight for apricot fruit confirmed higher values: 3.11%, 1.63%, 4.92%, 2.39%, and 42.55 kcal/100g, respectively. However, the moisture and carbohydrate content of the papaya fruit, at 88.75% and 7.52%, respectively, indicated greater values % of the fresh weight. The fruit pulps from apricots had extra tannin and phytate. Papaya fruit was greater in trypsin inhibitors, oxalates, and saponins. Gallic acid, quercetin, and protocatechuic acid were great phenolic components discovered in apricot fruit pulp. Papaya fruit pulp had the highest ranges observed in ferulic acid, p-coumaric acid, and catechin. Adding papaya fruit to apricot jam enhances its sensory and physical-chemical qualities when the ratio is (75 apricot + 25% papaya fruit). In conclusion, the mixed jam fruit, with its enhanced nutritional and phytochemical content, could potentially be utilized as a therapeutic diet, offering hope for practical applications in illness prevention and health maintenance.

Keywords: *Fruit, Jam, Nutritional Value, Fortification, Quality*

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Introduction

Vegetables and fruits are essential to human nutrition. However, due to the fact of their perishable nature, there are from time-to-time large losses after harvest (approximate to be between 25% and 80%) (1). Prunus armeniaca, the botanical identify for apricot, is a great member of the Rosaceae family. Apricots are cultivated all over the planet and are considered as a huge and essential fruit (2). Providing glucose, sucrose, and fructose is apricot fruit. Additionally, there is additionally a sufficient supply of minerals vitamins, and chemical substances known as polyphenols. The significance of flavonoids, carotenes, phenols, Vit. C, and E (3). Additionally, apricots are used as a remedy to therapy ailments, infections, and skin prerequisites precipitated by means of parasites. The fruit is used as ophthalmic, anti-pyretic, emetic, and anti-septic (4).

The papaya is the fruit of the Carica papaya plant, which is under the genus of Carica. One of the healthiest, most well-liked, and useful fruits is the papaya. Unlike most fruits, which are normally seasonal, it is additionally a year-round, nutritious vegetable in its green form. In contrast to the everyday requirements of 75g, the current fruit output yields 34g (5). This fruit's most important elements are: 88.4% moisture, 0.7g of ash, 0.8g of fiber, 1.9g of protein, 0.2g of fat, 8.3g of carbohydrates, 31 mg of calcium, 0.5 mg of iron, 8100IU of carotene, 67 mg/100g of Vit. C, 0.08 mg of Vit. B1, and 0.03 mg of Vit. B2 (ripe papaya). Ascorbic acid, or Vit. C is considerable in papayas, and the flesh has an excessive concentration of Vit. A. It has a excessive potassium content and little energy and sodium. Papaya additionally incorporates trace levels of calcium, iron, thiamin, riboflavin, and niacin (6). Papayas are beneficial in a range of contexts. This is a healthy fruit that is in most cases used for desk utilization or for canning. A huge range of preserves, which include syrups, wines, nectar, jams, jellies, marmalade, chutneys, pickles, candies, toffee, dehydrated flakes, infant meals, and fruited cereals, are made with each ripe and uncooked fruits (7). This is a very nutrient-dense tropical fruit that incorporates dietary fiber, minerals, complicated carbs, proteins, and vitamins. It additionally contains a range of biological phytochemicals, along with flavonoids, glycosides, phytosterols, and enzymes like papain and chymopapain (8). The mature fruit exhibited altered physicochemical properties, such as improved antioxidant undertaking and total flavonoid and phenolic content, as nicely as variations in total soluble solids, titratable acidity, and moisture content (9).

Jam is defined as a product made from healthy, ripe, fresh, frozen, dehydrated, or previously packed fruits. It can additionally consist of fruit juices, pulp, concentrate, or dry fruit that has been boiled into pieces, puree, or pulp with nutritive sweeteners like sugar, dextrose, liquid glucose, or invert sugar till the favored consistency (10). An enormous range of fruits can be used to make jams. It has an excessive dietary cost and is easily used. The fatty acid content material of the fruit jams is extraordinarily low. A realistic and reasonably priced supply of carbohydrates and electricity are fruit jams. Jams are now so extensively eaten up that most families have them as a "ready-to-serve" breakfast item (11). Fruit portions and different substances appropriate for the products may additionally be included. They ought to be made from any appropriate fruit (singly or in combination), have the taste of the original fruits, and be free of crystallization and burnt or disagreeable flavors. The product needs to be made from at least 45% by way of weight of the unique original fruit, except for any delivered sugar or non-compulsory components, and has a minimum of 65% total soluble solids (w/w) (12).

The aim of the current study was to predict qualitative aspects through analyzing the apricot jam's chemical composition, physiochemical, phytochemical, and organoleptic properties that had been improved with papaya fruit.

Materials and Methods

Materials

Source of fruits

Fruit from the nearby market was once used to prepare the apricot (Prunus armeniaca, L) and papaya (Carica papaya) for transportation, refrigeration, and storage at 4oC until processing and analysis.

Chemicals

All kind chemical components and reagents, which consist of standard components and Folin-Ciocalteu reagent, have been required from Al-Naser Co. for Chemicals, in Egypt. These have been of analytical reagent quality.

Jam ingredient

In this research, fruit pulp from apricots, and papaya, sugar, citric acid, and pectin have been made in the Nutrition and Food Science Department Laboratory at Menoufia University's Faculty of Home Economics.

Methods

Preparing pulp from apricot and papaya fruits

For the apricot and papaya fruit pulp preparation, the fruits had been washed fully with clean running water and cut into slices with stainless metal knife (13).

Fortification and Processing of apricot jam mixed with papaya fruit

The ripe apricot used to be properly cleaned with water. The seed and core have been removed by way of pulping. Initially, the pulp used to be blended with sugar and added to a boil while stirring continuously. Following the addition of pectin and citric acid, a total soluble stable of roughly 68% used to be seen. The pulp from papayas was fortified apricot jam at the ratio of 25, 25, 75, and 100%. Sterilized bottles had been filled with jam. Additionally, cooling, waxing, and capping have been carried out in order. At last, it was once saved in room temperature storage. The technique described by (14) was used to prepare the jam.

Analytical techniques

The techniques approved through the AOAC, (15) for measuring ash, moisture, protein, lipids, and fiber.

Carbohydrates and energy value

The formula for calculating carbohydrates is as follows: 100% Carbohydrates = 100% Moisture + 100% Protein + 100% Fat + 100% Ash + 100% Fiber.

FAO (16) states that the energy value estimate was once calculated by way of multiplying protein, carbohydrates, and lipids by 4 and 9.0, respectively.

Determination of the anti-nutritional factors of fruit pulp

The technique developed by Sadasivam and Manickam (17) was once used to determine the contents of phytic acid. The Abeza et al., (18) approach was used to analyze oxalate. After some adjustments, the AOAC (19) technique was used to analyze the tannin content of fruits. The technique for saponins was observed as noted by Domengza et al., (20). Trypsin-inhibitor assays have been performed using the colorimetric absorption approach at 410 nm, in accordance AOCS (21).

Characterization of phenolic compounds

The method described by (22) was used to extract, separate, and quantify phenolic chemicals. The Perkin Elmer PE200 HPLC system consisted of A thermostat in a column and an alternate pump, and an auto sampler. The following are the experimental parameters: injection volume of 20 µL, flow rate of 0.7 ml/min, negative ionization of ESI, dwell time of 50 ms, and transitions Among several reaction tracking. Stock solutions of the standards were diluted in the mobile phase to obtain functional standard solutions. The amounts of the compounds were calculated from the chromatogram peak regions using calibration curves as a reference. All solvents were HPLC grade and had been filtered and degassed before use.

Determining physicochemical characteristics:

Estimating the pH level

A glass electrode pH meter was once used for estimating the pH level. The pH of the samples was once measured using the authorized evaluation procedure (23) as quickly as the pH meter (model BA 350 EDT instruments, UK) had had a minute to settle down.

Measure the titratable acidity

The approach of (24), which concerned titrating samples with 0.1 N NaOH till pH 8.2 was reached, was used to quantify tradable acidity (TA). The effects of the triplicate analysis have been expressed as grams of citric acid per 100 grams of fresh weight.

Measurement of total soluble solids (TSS)

After mixing 10 g of the fruit with 60 ml of pH 7 distilled water, it was once filtered. To decide the TSS (°Brix), the supernatant was at once examined using a digital refractometer (Palette Digital PR-10, Atago, Japan) (24).

Measurement the vitamin C

According to (23), 2,6-dichloro-indophenol titrimetric techniques had been used to determine vit. C.

Measurement of Viscosity

A Brookfield viscometer with spindle range four and a speed of 30 rpm was once used to measure the viscosity of every sample (50 ml) in accordance with approach (25) at room temperature. Centipoises (cps) had been used to express viscosity. 2.2.7.6. Estimation of total carotenoids

Apricot and papaya fruit pulp's total carotenoids had been calculated using the approach outlined by (26).

Determination of reducing and total sugars

The titrimetric techniques of Lane and Enon (27) have been used to calculate the reducing and total sugars.

Measurement of hunter color scores

A spectrophotometer colorimeter (CM-2500D, Minolta) was once additionally used to measure the apricot and papaya fruit's Hunter colour traits (L*, a*, and b* values). The L* value, which runs from zero for black to a hundred for pure white, suggests lightness, whilst the a* value measures in accordance with (23).

Sensory evaluation of apricot jam fortified with papaya fruit

After cooking, jams were subjected to organoleptic tests (by ten judges) according to Watts et al., (28). Jading scale for color, aroma, taste, texture, and overall acceptability was as follows: Very good 8-9, good 6-7, fair, 4-5, poor 2-3, and very poor 0-1.

Statistical analysis

Three duplicates of each chemical analysis have been carried out. In accordance with the statistical package software (SPSS model 17.0), the results had been introduced as the mean ± SD (29).

Results And Discussion

Table (1) indicates the gross chemical composition of the fresh weight of the apricot and papaya fruits. Protein, fat, ash, fiber, and energy value as percentages of wet weight for apricot fruit confirmed greater values: 3.11%, 1.63%, 4.92%, 2.39%, and 42.55 kcal/100g, respectively. Conversely, the papaya fruit's moisture and carbohydrate content confirmed greater values as a % of fresh weight, at 88.75% and 7.52%, respectively. These outcomes had been consistent with (30), which said that the constituents of apricot fruit have been 84.39, 3.01, 1.53, 2.37, 4.94±, and 3.76% for moisture, crude protein, crude fat, crude fiber, ash, and nitrogen free extracts, respectively.

Furthermore, according to a study by (31) the fruit pulp's moisture percentage ranged from 85 to 92%, suggesting that the pulp of the fruit of papaya excessive moisture content and low protein content had been continuous.

The protein, fat, ash, fiber, carbohydrates, and energy value of the pulp of the fruit of papaya had been stated to be 7.35%, 4.28%, 4.00%, 15.53%, 68.84, and 343.28 kcal/100g, respectively, as a percentage of dry weight (32).

Table (1): Chemical constitution of fresh apricot and papaya fruit pulp

Constitutes %	Apricot fruit W/W	Papaya fruit W/W
Moisture	84.09± 1.74	88.75± 2.13
Protein	3.11± 0.12	0.81± 0.31
Fat	1.63± 0.23	0.55± 0.26
Ash	4.92± 0.15	0.51± 0.13
Fiber	2.39± 0.65	1.76± 0.52
Carbohydrates	3.86± 0.37	7.62± 1.21
Energy value (Kcal/100g)	42.55± 1.43	38.67± 1.64

WW= Wet weight. Values are means ± standard deviations of three replicate measurements.

The anti-nutritional composition of the pulp from apricot and papaya fruits is proven in table (2). It is clear from observation that the apricot fruit pulps had greater phytate and tannin contents. The corresponding averages were 1.42 and 1.25 g/100 g. Regarding papaya fruit, the average quantities of oxalates, saponins, and trypsin inhibitor had been observed to be greater in the fruit, being 0.80, 3.79, and 1.32 g/100 g, respectively. The results of this study are in line with those of (33) who found that the anti-nutritional content of apricot included 5.98 mg of phytate per 100 g, 1.25 TIU of trypsin inhibitor activity per mg, 2.14 g of saponins per 100 g, and 19.58 mg of oxalates per 100 g, respectively.
These anti-nutritional factors are known to interfere with metabolic processes such that growth and bioavailability of nutrients are negatively influenced (34). Some of these antinutrients have been found to have protection against some diseases (35).

Furthermore, the contents of oxalate content and phytates in papaya fruit were (1.63 and 3.77g/kg, respectively. Oxalate in excess by exceeding the solubility limit, lead to kidney stones made of calcium oxalate. However, the dietary contribution to excess oxalate was reportedly low (36).

Table (2): Anti-nutritional screening of apricot and papaya fruit pulp

Parameters	Apricot fruit (g/100g)	Papaya fruit (g/100g)
Tannins	1.42±0.26	0.61±0.20
Oxalates	0.64±0.21	0.80±0.42
Phytates	1.25±0.34	0.33±0.10
Saponins	2.11±0.43	3.79±0.48
Trypsin inhibitors	0.74±0.16	1.32±0.25

Values are means ± standard deviations of three replicate measurements.

Table (3) displays the phenolic substances identified via HPLC evaluation in the pulp of apricot and papaya fruits. The information received confirmed that the important phenolic elements in apricot fruit pulp were gallic acid, quercetin, and protocatechuic acid. The equivalent mg/100g values were 15.28, 29.40, and 43.15. Conversely, the phenolic elements in apricot fruit pulp with the lowest quantities include quercitrin, ferulic acid, and p-coumaric acid. The concentrations were 0.35, 0.39, and 1.07 mg/100 g, in that order.
On the contrary hand, ferulic acid, p-coumaric acid, and catechin contained the greatest quantities of phenolic elements in papaya fruit pulp; their respective values have been 277.98, 239.00, and 79 mg/100g. In contrast, the lowest quantities of phenolic elements in papaya fruit are viewed as vanillic acid, protocatechuic acid, and chlorogenic acid. The concentrations have been 1.83, 9.00, and 9.21 mg/100 g, in that order. These results are in line with those of (37), who suggested that phenolic element profiles got from HPLC analysis should be utilized as a "fingerprint" to identify qualitative and quantitative variants in apricot purees and nectars. P-coumaric, caffeic, and ferulic acids, as well as chlorogenic acid (50-caffeoylquinic acid), have been the important phenolic acids and their derivatives

discovered in all apricot cultivars under investigation.

Additionally, it used to be lately decided by way of the use of ultraviolet and HPLC that about nineteen phenolic compounds had been protected to consume the pulp of the fruit of papaya for the first time. For ten of the chemical compounds observed in the pulp of the fruit of papaya and active fractions, hydroxycinnamic acid glycosides have been the preliminary classification, and for 9 of them, quercetin glycoside derivatives. These phenolic compounds, which have strong antioxidant qualities, are determined in papaya fruit pulp (38).

Table (3): Quantification of Phenolic substances of apricot and papaya fruit pulp

Phenolic compound	Apricot fruit concentrations mg/100	Papaya fruit concentrations mg/100g
Quercitrin	1.07	30.00
Gallic acid	43.15	ND
Protocatechuic	15.28	9.0
Catechin	ND	79.0
Vanillic acid	4.90	1.83
Epicatechin	5.89	14.45
Syringic acid	ND	12.10
Chlorogenic acid	4.00	9.21
Caffeic acid	4.53	171.0
p-Coumaric acid	0.35	239.0
Ferulic acid	0.39	277.98
Quercetin	29.40	36.10
Sinapic acid	ND	39.23

ND= Not detected

The results of the organoleptic tasting of apricot jam greater with specific quantities of papaya fruit pulp are displayed in Table (4). Apricot fruit pulp made up the whole composition of the jam that acquired the perfect score (9.30 - 9.60) for all evaluated sensory attributes (color, flavor, taste, texture, appearance, mouthfeel, and overall acceptability).

The apricot jam that was incorporated with papaya fruit pulp (75% apricot + 25% papaya) revealed a slight minimize in every sensory attribute that was evaluated (color, flavor, texture, appearance, mouthfeel, and overall acceptability); the outcomes ranged from 9.10 to 9.30.

By comparison, amongst all the sensory characteristics evaluated, jam made just from papaya fruit obtained the lowest score. The data suggested that the jam made from 75% apricot fortified with 25% papaya fruit has the great sensory characteristics ever recorded. These results are in line with those of (39), who mentioned that the use of apricot kernel flour at a level of 6% greater the characteristics of taste, odour, and overall acceptance in the sensory evaluation of apricot jam supplemented with the flour. Because apricot kernels are less expensive and environmentally beneficial, they may additionally be used as an ingredient in numerous companies.

When fruit powder such as date pits is added to papaya jam, it greatly increases the fruit's nutritional content, total soluble solids, antioxidant potential, and preservation properties. An organoleptic study confirmed that little to no effect used to be viewed on the sensory traits that consist of color, texture, taste, scent, and general acceptability during the duration of a two-month storage length (40). Furthermore, (41) discovered that industrial apricot jam's regular acceptability dropped when it was once earlier kept at room temperature. in addition, proven how the apricot jam behaved during the time interval between manufacture and eating.

Table (5) displays the gross chemical constitution of apricot jam incorporated with papaya fruit. According to the collected data, the percentages of moist weight of the apricot fruit jam fortified with papaya fruit that contained moisture, protein, fat, ash, fiber, carbs, and energy value have been 12.65%, 4.85%, 0.64%, 0.58%, 2.46%, 78.82%, and

340.44 kcal/100g, respectively. These findings are constant with (42), who referred to that food's moisture content can be utilized to determine the amount of time it can continue to be on the shelf. A low moisture degree suggests a proper shelf life for the jams.

Table (4): Sensory properties apricot jam incorporated with various concentration of papaya fruit pulp

Items / Fortification %	Color	Flavor	Taste	Texture	Appearance	Mouth feeling	Overall acceptability
Jam (100 % apricot)	9.60 a	9.40 a	9.30 a	9.50 a	9.40 a	9.50 a	9.50 a
Jam (75%apricot+25%papaya fruit)	9.30 a	9.10 a	9.20 a	9.10 a	9.20 a	9.20 a	9.20 a
Jam (50%apricot+50%papaya fruit)	9.00 a	8.80 ba	8.90 b	8.80 b	9.00 a	8.80b	8.80 b
Jam (25%apricot+75%papaya fruit)	8.90 b	8.50 c	8.60 c	8.50 c	8.40 c	8.50c	8.50 c

Mean under the same line bearing different superscript letters are different significantly (P ≤ 0.05).

Most of the examined jams generally have very little fat, except for the apricot jam, which has greater little to non-fat at all. According to reports, the fats content of apricot, strawberry, blueberry, and grape is quite low (0.1–0.2 g/100 g) (43).

In addition, apricot jam has the following nutritional values: moisture (27.91–42.01 g/100 g), protein (0.27–0.53 g/100 g), fats (ND–0.10 g/100 g), carbs (55.43–71.29 g/100 g), total dietary fiber (N.D–1.69 g/100 g), ash (0.10–0.30 g/100 g), and energy value (227.88–287.66 kcal/100 g), respectively (44).

Table (5): Chemical constitution of apricot jam fortified with papaya fruit

Constitutes %	Apricot jam 75% fortified with papaya fruit 25% (W/W)
Moisture	12.65± 1.12
Protein	4.85± 0.55
Fat	0.64± 0.35
Ash	0.58± 0.51
Fiber	2.46± 0.60
Carbohydrates	78.82± 2.30
Energy value (Kcal/100g)	340.44± 3.91

WW= Wet weight. Values are means ± standard deviations of three replicate measurements.

The data in table (6) indicates the physicochemical properties of the apricot jam incorporated with papaya fruit. The following parameters are present in the apricot jam incorporated with papaya fruit pulp: pH, titratable acidity, TSS, viscosity, and reflective index, in that order: 3.62, 0.48 percentage as citric acid/100g fresh weight, 67.50 o brix, 1.68 centipoises, and 13521, respectively.

On the other hands, the total and reducing sugar concentrations of the apricot jam incorporated with papaya fruit pulp had been 54.85% and 33.37%, respectively. Ascorbic acid and total carotenoids in apricot jam incorporated with papaya fruit pulp have been additionally observed to be 30.90 mg AAA/100g and 3.92 mg/100g, respectively, in accordance with the results.

The data confirmed that the values of L* (lightness), a* (redness), and b* (yellowness) in the apricot jam incorporated with papaya fruit pulp had been 40.26, 0.60, and 1.87, respectively. The physico-chemical characteristics of jam made from apricot were discovered to have the following mean values, in accordance with (45): 3.69 pH, 0.66% total acidity, 6.54% vit. C (mg/100g), 77.01% moisture, 21.3% TSS, 4.13% reducing sugars, and 9.2% non-reducing sugars.

Because fruit pulps and their byproducts' acidity indicate meals degradation and fermentation, they are additionally necessary indicator of a meal's quality. This is comprehensive due to the fact taste is impacted by means of the TSS to acidity ratio (46).

The a*, b*, and Chroma values increased along with the increase in yellow-orange intensity on mango pulp and skin, whereas the L* and °Hue values decreased. They discovered a correlation between these color changes and a rise in the quantity of carotenoids (47).

The sycamore fruit jam's physicochemical traits have been as follows: 4.03, 67.80%, 0.45%, 26. 25 mPa.s, 43.50%, and 28.20% for pH, total soluble solids, titratable acidity, viscosity, total sugar, and reducing sugar, in that order (48).

Table (6): Physicochemical characteristics of apricot jam incorporated with papaya fruit pulp

Characteristic	Concentrations of apricot75% jam fortified with papaya fruit25%
pH	3.62±0.21
Titratable acidity, (%Citric acid/100 g FW)	0.48±0.10
TSS (oBrix)	67.50±1.53
Viscosity (CP)	1.68±0.22
Reflective index	1.3521
Reducing sugars, %	33.37±1.25
Total sugars, %	54.85±1.74
Vitamin C (mg AAE/100 g)	30.90±1.33
Total Carotenoids (mg/100 g)	3.92±0.41
Color parameters	
L* (lightness)	40.26±0.53
a* (redness)	0.60±0.11
b* (yellowness)	1.87±0.30

TSS = Total soluble solids. (CP) = Centipoises, AAE= Ascorbic acid equivalents, Values are means ± standard deviations of three replicate measurements.

4. Conclusion

The data collected highlighted the importance of therapeutic nutrition by exhibiting the excellent nutritional value, sensory evaluation, and phytochemical content of apricot jam incorporated with papaya fruit pulp.

Conflict of Interest

The authors declare that there is no conflict of interest.

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خصائص وجودة مربى المشمش المدعم بلب فاكهة البابايا

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الملخص العربي:

هدف الدراسة الحالية هو التعرف على التركيب الكيميائي لمربى المشمش والعوامل المضادة للتغذية (الأكسالات, التانينات, الفيتات, السابونين, مثبط التربسين) والتعرف على المركبات الفينولية والخصائص الحسية والطبيعية-الكيميائية (الرقم الهيدروجينى، الحموضة الكلية، اللزوجة، معامل الانكسار، المواد الصلبة الذائبة الكلية، السكر الكلى والمختزل، فيتامين سى، إالكاروتينات الكلية، معايير اللون) وخصائص الجودة عند تدعيمها مع لب فاكهة البابايا. أشارت النتائج إلى أن قيمة البروتين والدهون والرماد والألياف والطاقة في لب فاكهة المشمش والبابايا كنسب من الوزن الرطب لفاكهة المشمش سجلت قيمًا أعلى حيث كانت: ٣,١١٪، ١,٦٣٪، ٤,٩٢٪، ٢,٣٩٪، ٤٢,٥٥ كيلو كالوري / ١٠٠ جرام على التوالي. بينما سجلت أعلى قيم في محتوى الرطوبة والكربوهيدرات في فاكهة البابايا، حيث كانت القيم ٨٨,٧٥٪، ٧,٥٢٪ على التوالي كنسبة مئوية من الوزن الطازج. تحتوي لب الفاكهة من المشمش على المزيد من التانين والفيتات، بينما كانت فاكهة البابايا أعلى في مثبط التربسين والأكسالات والسابونين. تم التعرف حمض الجاليك والكيرسيتين وحمض البروتو كاتيكويك كمركبات فينولية بنسب عالية في لب فاكهة المشمش. بينما لوحظت أعلى مستويات لب فاكهة البابايا مع حمض الفيروليك وحمض البى .كيوماريك والكاتشين. أدى تدعيم فاكهة البابايا إلى مربى المشمش على تعزيز صفاتها الحسية والطبيعية والكيميائية، خاصة عندما تكون نسبة الفاكهة (٧٥% مشمش + ٢٥% بابايا). باختصار، يمكن استخدام مربى الفاكهة المدعمة كنظام غذائي علاجي والوقاية من الأمراض بسبب القيمة الغذائية العالية ومحتوى المواد الكيميائية النباتية في لب فاكهة المشمش والبابايا

الكلمات الكاشفة: الفاكهة، المربى، القيمة الغذائية، التدعيم، الجودة.

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