*Ilaro Journal of Women in Technical Education and Employment (Ilaro J Wom Tec Edu Emp)*
*The Federal Polytechnic, Ilaro. Ogun State, Nigeria.*
*ISSN: 2734-3227. Volume 1 – Issue 2. December 2020*
*https://fpiwitedjournal.federalpolyilaro.edu.ng*



# Proximate Composition, Amino Acid Profile and Vitamin C Contents of Different Date Jam Blends

**Omotayo Alokun-Adesanya and Kehinde Adebisi**
Department of Food Technology, Federal Polytechnic, Ilaro, Ogun State, Nigeria
E-mail: omotayo.alokun@federalpolyilaro.edu.ng; Kehinde.adebisi@federalpolyilaro.edu.ng

## Abstract

The proximate composition, amino acid and vitamin C determination of jam produced from date fruits enriched with apple and orange fruits at different proportions were investigated. Three different blends of jam coded as AA, BB and CC were produced with strawberry jam as control (SS) purchased from a reputable store. The proximate compositions show significant difference with moisture content of 25.27-27.52 respectively and high considerable amount of carbohydrate and energy. The control has the lowest Vitamin C while CC has the highest value 9.82-11.23 respectively. The amino acid profile and vitamin C show significant difference which is attributed to mixed of fruits and bringing to boil technic done for the jam.

Key words: Amino acid, apple, date, jam, orange.

**ARTICLE HISTORY**

Received: May 29, 2020
Revised: June 30, 2020
Accepted: Oct. 25, 2020

**Citation**

Alokun-Adesanya, O. & Adebisi, K. (2020). Proximate Composition, Amino Acid Profile and Vitamin C Contents of Different Date Jam Blends, *Ilaro Journal of Women in Technical Education and Employment*, 1(2), 1-7

## 1. Introduction

Dates can be widely considered as a good source of food security and important fruit (Al-Marshudi, 2002) and a key source of stability. It is Cultivated for its edible sweet fruit. The chemical composition of date varies and thus influence their industrial utilization, nutritional value and sensory qualities. Date can be used to produce valuable products, such as fibre concentrate date flour, sugar, juice, date bars and functional ingredients in beverages, baking and dairy industries. These help to make the palm date an economical commodity. Certain features are important when considering quality criteria for consumer and they include appearance, colour, taste, shape and size, physical condition of date.

Apples are fruits provide vitamins A, C and some certain nutrients inclusive. They are very good/excellent source of dietary fibre and high in carbohydrates. Apples are eaten fresh or cooked in a variety of ways. Oranges are fruits and they grow in different sizes, varying from spherical to oblong and shapes. It is attached to the rind porous white tissue, the white, bitter mesocarp or albedo (pith). The orange as a number of distinct carpels segments inside (about ten), each segmented by a membrane which contain many juice-filled vesicles and usually a few seeds (pips). The fruit is low in calories, contains no saturated fats or cholesterol, but rich in dietary fibre, pectin. Pectin, by its virtue as a bulk laxative, helps protect the mucosa of the colon by decreasing its exposure time to toxic substances as well as by binding to cancer-causing chemicals in the colon. Oranges are an excellent source of vitamin-C provides 48.5 mg\100g and a very rich citrus fruit.

Jam can be produced by mashing/chopping of fruit, vegetable pulp and by boiling it with sugar and water. The quantity of sugar and fruit varies according to the fruit and its ripeness. When the mixture reaches a certain temperature, the acid and the pectin in the fruit react with the sugar hereby making the jam to set on cooling. The gelling agent in jam is pectin which is used in the production of commercialized jam (Madhav and Pushpalatha, 2002). But for the purpose of this research we are making use of natural pectin that can be gotten

from fruits. Jam typically contains both the juices and flesh of a fruit or vegetable. A good jam must have bright colour, good fruity flavour, semi-jellied texture that is easy to spread and a soft even consistency without distinct pieces of fruit but has no free liquid in its attribute/ features (Berolzheimer, et al. 2003). Production of jams are done in other to preserve fruits that are in excess and are canned or sealed to extend their shelf lives. Examples of fruits were commonly used in the production of jams are lemons, cranberries, apples and apricots (Burkill, 2007).

However, the objectives of this research are to produce acceptable jam from date enriched with apple, orange using natural pectin from these fruits and comparing it with readymade strawberry jam that was produced on a commercial level where commercialised pectin is used. So as to know the effect of commercialized and natural pectin on jam produced, also to determining proximate composition, amino acid and vitamin C. This research also aimed at ways to tackle the under-utilization of date in Nigeria, to preserve the fruit during off-season, and ways to incorporate date into our diet due to religion barriers.

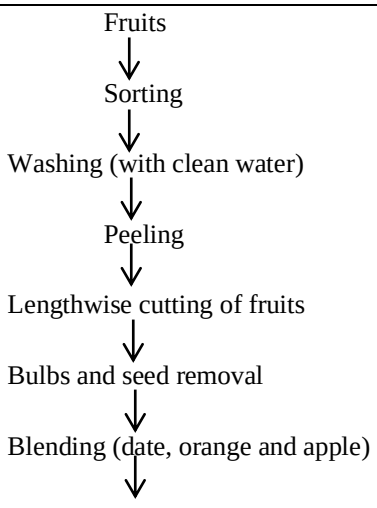
## 2. Method of Preparation of Jam

**Jam Production**

Bulks of date, orange and apple fruits were sorted to remove damaged and unhealthy ones and then washed with clean water to ensure the cleanliness of the materials for jam production. The three fruits were mixed in ratios shown in Table 1 to give different blends date jams. Jam production was done following the procedure of Aspara and Palata, (2002) with slight modification. The modification introduced must be explained and the reason for the modification must be stated here. Figure 1 depicts the flow chart of the procedure.

Table 1. Proportions of fruits in the mixtures for preparation of Date jam blends

| **Fruit blends for Jam production and Control** | **Proportions of fruits in the blend (%):** | | |
|---|---|---|---|
| | **Date** | **Orange** | **Apple** |
| Date + Apple | 90 | - | 10 |
| Date + Orange | 90 | 10 | - |
| Date + Apple + Orange | 80 | 10 | 10 |
| Strawberry jam (Control) | Not applicable | Not applicable | Not applicable |



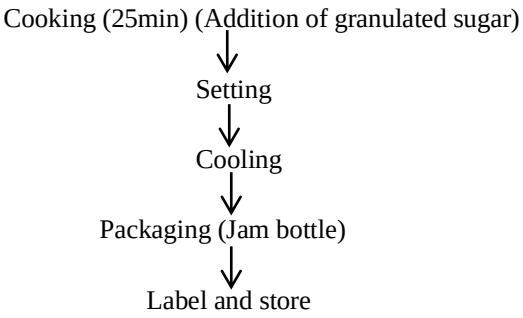



Figure 1. Flowchart for jam production

### 2.1 Analytical procedures

The proximate compositions (that is, moisture, ash, crude fibre, nitrogen and ether extract) of the various Date jam blends and the control jam were determined according to the procedures of AOAC (2000). Nitrogen content was determined by the micro Kjeldahl method, and subsequently, crude protein was estimated by multiplying %N by a factor 6.25. Carbohydrate (Nitrogen free extractives) was calculated by difference. Food energy was calculated by multiplying %fat, %crude protein and %carbohydrates by Atwater factors of 9, 4 and 4, respectively (Osborne & Voogt,1978).

Furthermore, total soluble solids (% Brix) and pH of the samples were determined using hand refractometer and digital pH meter, respectively. Total titratable acidity (TTA) was determined according to AOAC (2000) method.

Ascorbic acid contents of the samples were determined by titrimetric method using 2.6-dichloroindophenol (AOAC, 2000).

### 2.2 Amino acid profile determination

Sample were removed from the date jam blends and the control, dried in the oven, defatted with petroleum spirit and then hydrolyzed completely by soaking in 1M KOH followed by incubation at 110$^{o}$C for 48h in semantically closed borosilicate glass container. The hydrolysates were neutralized (pH 2'5 – 5.0), purified with cation exchange solid-phase extraction to form the derivatives with ethyl chloroformate using the Technicon Sequential Analyzer Union Carbide Corp. New York, NY (TSM). Subsequently, the excess derivatizing reagent was removed by scavenging with Nitrogen gas. The derivative amino acid that is free of derivatizing reagent was made up to 1ml in a vial for gas chromatography analysis.

### 2.3 Statistical analysis

All analytical determinations were done in three replicates and the results were presented as the mean values and their standard deviations. All data collected were subjected to analysis of variance and the significantly different means were compared using the Duncan Multiple Range Test (SPSS, 2016).

## 3. Results

**Table 2. Chemical composition of date jams of different fruit blends and Strawberry jam**

| **Constituent** | **Jam produced from different fruits blends** | | | **Strawberry jam (Control)** |
|---|---|---|---|---|
| | **Date + Apple** | **Date + Orange** | **Date + Apple +** | |

| | | | Orange | |
|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Moisture (%) | 27.52±0.02[a] | 25.27±0.02[b] | 26.14±0,02[ab] | 25.27±0.01[b] |
| Ether extract (%) | 0.91±0.02[a] | 0.66±0.02[b] | 0.74±0.01[ab] | 0.83±0.02[a] |
| Ash (%) | 1.87±0.02[a] | 1.13±0.02[c] | 1.64±0.01[b] | 1.76±0.01[ab] |
| Crude fibre (%) | 0.42±0.02[b] | 0.33±0.02[c] | 0.64±0.02[a] | 0.53±0,02[ab] |
| Crude Protein (%) | 1.33±0.02[ab] | 1.04±0.02[c] | 1.37±0.01[a] | 1.32±0.01[ab] |
| Carbohydrate (%) | 67.72±0.01[ab] | 71.57±0.03[a] | 69.86±0.02[ab] | 67.73±0.02[ab] |
| Food energy (Kcal/100g) | 284.39±0.02[b] | 298.67±0.02[a] | 291.58±0.01[ab] | 283.67±0.01[b] |
| Ascorbic acid (mg/100g) | 10.13±0.03[c] | 11.00±0.02[b] | 11.23±0.03[c] | 9.82±0.01[a] |

*mean values in a row denoted by different superscripts (a-c) are significantly different at P(0.05)

**Table 3. Amino acid profile of jam produced from different blends of fruits and strawberry jam**

| **Amino acid** | **Date jam of different fruit blends** | | | | | | **Strawberry jam** | |
|---|---|---|---|---|---|---|---|---|
| | **Date + Apple** | | **Date + Orange** | | **Date + Apple + Orange** | | | |
| | **g/100g** | **Score (%)** | **g/100g** | **Score (%)** | **g/100g** | **Score (%)** | **g/100g** | **Score (%)** |
| **Glycine** | 9.37 | 187.4 | 8.80 | 176 | 10.24 | 205 | 9.13 | 183 |
| **Alanine** | 10.70 | 214 | 8.30 | 166 | 4.27 | 94 | 10.81 | 216 |
| **Serine** | 11.77 | 235.4 | 9.73 | 194.6 | 14.00 | 280 | 12.07 | 241 |
| **Proline** | 13.71 | 274.2 | 14.04 | 280.8 | 13.45 | 269 | 13.68 | 274 |
| **Valine** | 16.06 | 321.2 | 15.37 | 307.4 | 14.09 | 282 | 15.51 | 310 |
| **Threoline** | 15.80 | 316 | 15.32 | 306.4 | 16.20 | 324 | 17.17 | 343 |
| **Isoleucine** | 17.50 | 350 | 18.10 | 362 | 18.37 | 367 | 11.57 | 231 |
| **Leucine** | 18.47 | 369.4 | 33.87 | 677.4 | 43.00 | 860 | 41.73 | 835 |
| **Aspertane** | 19.31 | 386.2 | 32.57 | 651.4 | 53.93 | 1079 | 19.53 | 391 |
| **Lysine** | 21.01 | 420.2 | 21.19 | 423.8 | 40.23 | 805 | 20.54 | 411 |
| **Methonine** | 21.41 | 428.2 | 22.05 | 441 | 21.56 | 431 | 21.50 | 430 |
| **Glutamate** | 21.53 | 430.6 | 22.25 | 445 | 20.91 | 418 | 20.84 | 417 |
| **Phenylanine** | 19.73 | 394.6 | 21.53 | 430.6 | 23.34 | 467 | 2.89 | 58 |
| **Histidine** | 24.07 | 481.4 | 24.05 | 481 | 22.44 | 449 | 24.04 | 481 |
| **Arginine** | 24.83 | 496.6 | 25.10 | 502 | 23.29 | 466 | 25.06 | 501 |
| **Tyrosine** | 25.05 | 501 | 24.11 | 482.2 | 22.88 | 458 | 3.57 | 71 |
| **Tryptophan** | 26.10 | 522 | 19.11 | 382.2 | 25.13 | 503 | 26.17 | 523 |
| **Cystine** | 26.44 | 528.8 | 14.44 | 288.8 | 26.18 | 524 | 14.55 | 291 |
| **AEAA[1]** | 70.88 | 1417.6 | 64.75 | 1295 | 71.35 | 1427 | 32.63 | 653 |
| **TEAA[2]** | 180.15 | 3603 | 190.59 | 3811.8 | 208.16 | 4163 | 181.12 | 3622 |
| **TNEAA[3]** | 143.40 | 2860 | 159.34 | 3186.8 | 175.16 | 3503 | 129.24 | 2585 |

[1]AEAA = Aromatic Essential Amino Acid; [2]TEAA = Total Essential Amino Acid; [3]TNEAA = Total Non-Essential Amino Acid

## 4. Discussion

The result obtained showed the amount of proximate analysis of jam produce from date, apple and orange. The results obtained also shows that commercial strawberry jam brought for comparison shows no significant difference ($p \leq 0.05$) when compare with samples (CC, BB and AA).

Sample CC shows a significant difference ($p \leq 0.05$) when compare to others this might be due to the fact that combine fruit is been used except for its carbohydrate, ash and energy. Mohd et al, (2015) reported a relatively low protein content which coincide with the low protein content observed in the jam. The shelf life of a product usually determined by moisture (Eke-Ejiifor and Owuno 2013; Awolu et al, 2018) sample AA as the highest moisture content which might be due to the water added during blending of the apple. When jams are processed, they tend to have lower nutritional values compared to fresh fruits due to exposure to the heat during processing (Jawaheer et al., 2003). The ether extract of the jam sample ranges from 0.64% to 0.93 which was lower to that of Ajenifuja and Aina 2011; Awolu et al 2018 it might be due to the fact that three or more fruit were use and or the level of pH of the fruits. The overall physical characteristics, such as flavor, texture, mouth feel and appearance plays a major role in determining of fat in many foods (Muhammad and Nizamani, 2009). Fat content of different fruits is usually not greater than 1%. The ash content of the jam sample range between 1.11% - 1.89%.

The result obtained showed that the amount of vitamin C in mg/100g of SS the control jam is 9.82mg/100g is lower while sample AA, BB, CC were 10.13mg/100g, 11.00mg/100g, 11.23mg/100mg are higher respectively. These attributes could be the fact that the samples were produced from different fruit. Although there is little significance difference in the Vitamin C content of the sample the one with apple, orange and date has the highest, it could be the combination of different fruit in the jam because dates contain a small amount of vitamin C as reported by Walid and Richard (2003) 6.4-11.5% which depend on variety and degree of ripeness. Low heat treatment given to the vitamin C reduced loss of the vitamin.

The result showed that the essential amino acid in sample AA, BB, CC and SS is 37.3g/100g, there is a significant difference on the essential amino acid in sample AA,BB, CC and SS and a significant difference in the non-essential amino acid in sample BB, SS, AA and CC. For sample AA tryptophan as the highest amino acid which conforms to FAO/WHO, 1974 and glycine as the lowest amino acid. For sample BB aspertane has the highest amino acid and alanine is the lowest amino acid. For sample CC aspertane is the highest amino acid and proline is the lowest amino acid. For sample SS tryptophan is the highest amino acid and glycine is the lowest amino acid.

## 5. Conclusion

This research work has shown that mixed fruit jam can be produced from date, apple and orange fruit. The results further show that sample CC has high vitamin C content because three (3) different fruit is mixed together to produce the jam. Conclusively, the sample BB has high amount of glutamate compared to the other amino acids and also a considerable amount of vitamin C. Tt also shows that natural pectin gotten from fruit can be used for the production of date jam.

## Acknowledgement

The authors wish to acknowledge the technical assistance provided by Olojede, W. R and Brown, B. J in the preparation of this work.

## References

Al-Marshudi, S. (2002). Oman Traditional Date Palms: Production and Improvement of Date Palms in Oman. *Tropiculturae* 20 (4), 203–209.

Ajenifujah-Solebo, S.O & Aina, J.O. (2011). Physico-Chemical Properties and Sensory Evaluation of Jam Made from Black-Plum Fruit (vitex Doniana). *African Journal of Food, Agriculture, Nutrition and Development*. 11(3).

AOAC (1995). Official Method of Analysis. Association of Official Analytical Chemists. 16th edition, Washington, DC.

AOAC (2000). Official Method of Analysis. Association of Official Analytical Chemists 942.15. Acidity (Titra table) of Fruits Product with AOAC Official Method 920, 17th edition, Washington, D.C.

Apsara, M. & Push, B. (2000). Quality Degradation of Fellies Prepared using Pectin Extracted from Fruit Waster: *Journal of tropical Agricultural*.

Awolu, O.O., Okedele, G.O., Ojewumi, M.E., & Oseyemi, F.G (2018). Functional Jam Production from Blends of nal; Banans, Pineapple and Watermelon Pulp. *International Journal of Food Science and Biotechnology*. 3(1), 7-14.

Berolzheimer, R., Bentley, M. and Flora, R. (1959). The American Woman's Cookbook. Consolidated Book Publishers, Inc, Cornell University Press. pp. 10-22.

Burkill, H. (1997). The Useful Plants of West Tropical Africa. Vol. 4, Second Edition. Royal Botanic Gardens: Kew, U.K. pp. 160.

Eke-Ejiofor, J, Owuno, F (2013). The Physico-chemical and Sensory Properties of Jackfruit (Artocarpus heterophilius) Jam. *International Journal of Nutrition and Food Sciences*. 2 (3), 149-152.

FAO/WHO/UNICEF PAG (1970). Recommendation on Amino Acid Fortification of Food. PAG Statement No. 9.

Fomon and Filer (1974). Improvement of Protein Nutrition by Committee on Amino Acid Food and Nutrition Board, National Research. Washington D.C. ISDN:0-309-02234-7.

Jawaheer, B., Goburdhun, D & Ruggoo, A. (2003). Effect of Processing and Storage of Guava into Jam and Juice on the Ascorbic Acid Content. *Journal of Plant Food Human Nutrition 58, 1-12*

Madhav, A., & Pushpalatha, P.B., (2002). Characterization of Pectin Extracted from Different Fruit Wastes. *Journal of Tropical Agriculture*, 40(1-2), 53-55.

Makanjuola, O. & Alokun, O. (2019). Microbial and Physicochemical Properties of Date Jam with Inclusion of Apple and Orange Fruits. *International Journal of Food Science and Nutrition*. 4(3), 102-106

Mohd Naeem, M., Mohd Fairulnizal, M., Zaition, A., Norliza, A., Wan Syuriahti, W., Mohd Azerulazree, J., Aswir, A.R. & Rusidar S. (2015). The Nutritional Composition of Fruit Jams in the Malaysian Market. *Journal of the Saudi Society of Agricultural Science*. 2,1-8.

Muhammed, S., Saghir, A., and Nizamani, S. (2009). Determination of Nutritive Values of Jamun Fruit. (Eugenia jambolana) Products. *Pakistan Journal of Nutrition.* 8.

Walid, A., and Richard J. (2003). The Fruit of the Date Palm: Its Possible Use as the Best Food for The Future? *International Journal of Food Sciences and Nutrition*, 54(4), 247-259.