AMINO ACID PROFILE AND VITAMIN C DETERMINATION OF ENRICHED DATE JAM

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ABSTRACT

Date is an underutilized crop in Nigeria, there is needs to diversify and enhance its uses. The amino acid and vitamin C determination of jam produced from date fruits enriched with apple and orange fruits at different proportions were investigated. Three (3) different blends of jam (coded has AA (Apple:Date), BB(Orange:Date) & CC(Apple:Orange:Date) were produced with strawberry jam (SS) purchased from a reputable store. The control which is SS has the lowest Vitamin C while CC has the highest value 9.82-11.23 respectively. The amino acid profile and vitamin C shows significant difference which might be due to mixed of fruits and bringing to boil technic done for the jam.

Key words: Date, Jam, Amino Acid, Apple, Orange.

1. INTRODUCTION

Dates are widely considered to be a source of food security as well as an important cash crop (Al-Marshudi, 2002) and as a key source of stability. It is Cultivated for its edible sweet fruit. Variations in the chemical composition of date fruit is expected to influence their nutritional value, sensory quality and industrial utilization. Date seed representing 10-15% of the whole fruit is a valuable by product of the date fruit processing characterised by a high level of water insoluble fibres and may be used to enhance the fibre content of certain food product (Makanjuola and Alokun, 2019). The ability to use date to produce value added products, such as date flour, fibre concentrate, juice, jam, date based fruits bars, sugar and functional ingredients in beverages, dairy and baking industries will help to make the palm date an economically viable commodity. The important quality criteria for consumer are the appearance including color, taste, shape and size, physical condition of date.

Apples are fruit and they provide certain nutrient, vitamins A and C inclusive, they are high in carbohydrates, and also an excellent source of dietary fibre. Apples are eaten fresh or cooked in a variety of ways; they are frequently used as a pastry filling and apple pie.

Oranges are fruits and they grow in different sizes, shapes varying from spherical to oblong. Inside and attached to the rind is a porous white tissue, the white, bitter mesocarp or albedo (pith). The orange contains a number of distinct carpels segments inside, typically about ten, each delimited by a membrane, and containing 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, like other citrus fruits, are an excellent source of vitamin-C provides 48.5 mg per 100g.

Jam is produced by taking mashed or chopped fruit or vegetable pulp and boiling it with sugar and water. The proportion of sugar and fruit varies according to the type of fruit and its ripeness, but a rough starting point is equal weights of each. When the mixture reaches a temperature of 104°C the acid and the pectin in the fruit react with the sugar, and the jam will set on cooling. It typically contains both the juice and flesh of a fruit or vegetable. Good jam has a soft even consistency without distinct pieces of fruit, a bright color, a good fruit flavor and a semi-jellied texture that is easy to spread but has no free liquid (Berolzheimer, et al. 2003). Jams are produced by the preservation of fruits which are canned or sealed to extend their shelf lives. Normally, the jam preparations require the addition of commercial or natural pectin as a gelling agent (Madhav and Pushpalatha, 2002). Fruits such as lemons, cranberries, apples and apricots were commonly used in the production of jams (Burkill, 2007).

2. METHOD OF PREPARATION OF JAM

Materials

The production of jam was done by using Aspara and Palata, (2002) method with little modification. Fresh oranges and apples were sorted, weighed and peeled. The fruits are blended in pairs and were mixed in different ratios and were labelled. These different blends were cooked till they are cone, hot filled, labelled and stored in a cool dry place.

Sample Preparation

Table 1: Sample Mixing Ratios

Samples	Dates (%)	Orange (%)	Apple (%)
AA	90	-	10
BB	90	10	-
CC	80	10	10
SS	Strawberry Jam		

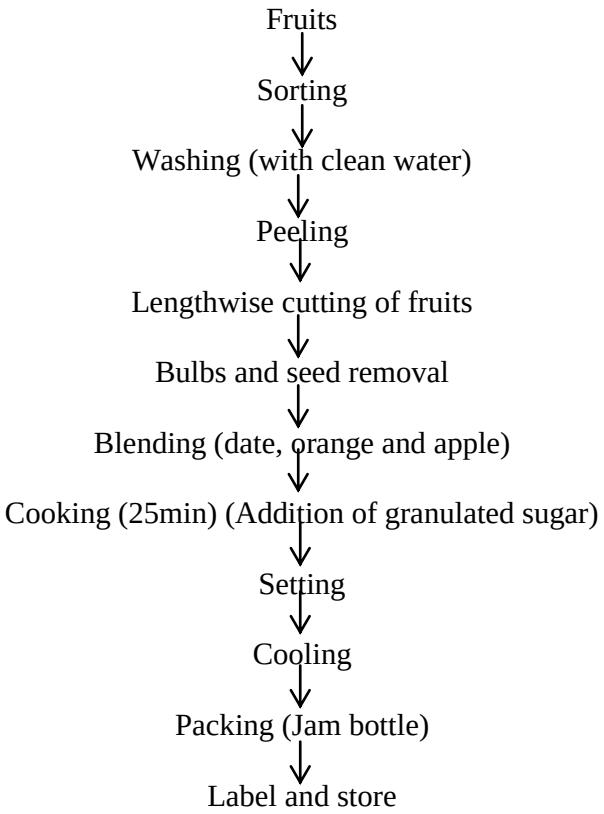

Fig 1: Production flow chat of jam produced from orange, apple and date

Analysis for Determining Amino Acid

The dried and pulverized sample made to be free from water by ensuring constant weight for a period of time in the laboratory. The sample of 0.5g was weighed into 250ml conical flask capacity sample was de-fattened by extracting the fat content of the sample with 30ml of the petroleum spirit 3 times with soxchlet extractor that was equipped with thimble. The sample was hydrolyzed 3 times for complete hydrolysis to be achieved for the totality of amino acid recovery. The pulverized and defatted sample was soaked with 30 ml of the 1M Potassium hydroxide solution ad was incubated for 48 hours at 110 degree Celcius in semantically closed borosilicate glass container. After the alkaline hydrolysis, the hydrolysate was neutralized to get PH in the range of 2.5 - 5.0. The solution was purified by cation-exchange solid-phase extraction. The Amino acid in purified solution were derivative with ethyl chloroformate by the established mechanism using the Technicon Sequential Analyzer Union Carbide Corp., New York, N.Y. (TSM).

DERIVATIVE MECHANISM

The derivatisation of the extracted amino acid for the volatility sake in the gas chromatography with ethylchloroformate. The derivatising reagents removed by scavenging with Nitrogen gas for proper mop up of the excess reagent. The derivative amino acid that is free of derivatising reagent was made up to 1ml in a vial for gas chromatography analysis.

ASCORBIC ACID DETERMINATION

10ml of the filtrate was prepared into the conical flask and filtered immediately with the standard solution of 2,6dichloroindophenol to faint pink end point which persisted for 15 second. The

ascorbic content of the sample was then calculated from the relationship below; V= Titre value of the sample, T= Ascorbic acid equivalent of dye solution expressed as mg/ml of dye and W= Gram of sample in aliquot titrated (AOAC, 2000).

Ascorbic Acid (mg/100ml) =

$$\frac{V \times T}{W} \times 100 \quad (1)$$

3. RESULT AND DISCUSSION

Table 2: Vitamin c content of date jam using apple and orange fruits

Sample	Vitamin C mg/100g
AA	10.13 ± 0.03^{c}
B B	11.00 ± 0.02^{b}
CC	11.23 ± 0.03^{c}
SS	9.82 ± 0.03^{a}

Means values having different subscripts within a column are significantly different ($p<0.05$)

Key: AA – Date:Apple
BB – Date:Orange
CC – Date:Apple:Orange
SS – Commercial Strawberry Jam

Table 3: Amino acid profile of jam made from date, apple and orange fruit

AMINO ACIDS	SAMPLE AA	SAMPLE BB	SAMPLE CC	SAMPLE SS
Glycine	9.37±0 .04^{b}	8.80±0 .02^{a}	10.24±0 .05^{c}	9.13±0 .03^{ab}
Alanine	10.70±0 .03^{b}	8.30 ±0.02^{ab}	4.27 ±0.01^{a}	10.81 ±0.01^{a}
Serine	11.77 ±0.01^{a}	9.73 ±0.01^{a}	14.00± 0.03^{ab}	12.07± 0.01^{a}
Proline	13.71±0 .01^{a}	14.04±0 .02^{ab}	13.45±0 .01^{a}	13.68 ±0.01^{a}
Valine	16.06 ±0.09^{c}	15.37 ±0.03^{b}	14.09 ±0.01^{a}	15.51±0 .05^{bc}
Threoline	15.80±0 .70^{ab}	15.32 ±0.02^{a}	16.20 ±0.10^{b}	17.17±0 .15^{c}
Isoleucine	17.50±0 .05^{b}	18.10±0 .04^{b}	18.37±0.04^{b}	11.57±0.04^{a}
Leucine	18.47±0 .0^{a}	33.87± 0.04^{b}	43.00± 0.03^{b}	41.73± 0.03^{b}
Aspertane	19.31 ±0.08^{a}	147.57±0.22^{b}	213.93 ±0.22^{b}	19.53±0 .06^{a}
Lysine	21.01 ±0.49^{a}	21.19± 1.17^{b}	40.23±0 .10^{c}	20.54±0 .06^{a}
Methonine	21.41 ±0.35^{a}	22.05 ±0.05^{b}	21.56±0 .12^{a}	21.50 ±0.10^{a}
Glutamate	21.53±0 .61^{ab}	22.25 ±0.23^{b}	20.91± 1.05^{a}	20.84 ±0.41^{a}
Phenylanine	19.73±0.04^{a}	21.53 ±0.50^{b}	23.34±0 .20^{b}	2.89 ±0.04^{a}
Histidine	24.07±0 .06^{b}	24.05 ±0.05^{b}	22.44 ±0.10^{a}	24.04±0 .05^{b}
Arginine	24.83±0 .05^{b}	25.10 ±0.05^{b}	23.29 ±0.08^{a}	25.06 ±0.05^{b}
Tyrosine	25.05±0 .05^{d}	24.11 ±0.11^{c}	22.88±0 .81^{b}	3.57±0 .20^{a}
Tryptophan	26.10 ±0.02^{c}	19.11±0.09^{a}	25.13 ±0.06^{b}	26.17±0.09^{a}
Cystine	26.44 ±0.12^{b}	14.44±0 .41^{a}	26.18 ±0.14^{b}	14.55 ±0.48^{a}

Means values having different subscripts within a column are significantly different ($p<0.05$)

Key: AA – Date:Apple
BB – Date:Orange
CC – Date:Apple:Orange
SS – Commercial Strawberry Jam

Discussion

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. This 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% depending 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 AB, C and D 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.

Conclusion

This research work has shown that mixed fruit jam can be produced from date, apple and orange fruit. The results further shows that the product i.e., 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.

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