Asian Jr. of Microbiol. Biotech. Env. Sc. Vol. 25, No. (4) : 2023 : 851-856

ISSN-0972-3005

DOI No.: http://doi.org/10.53550/AJMBES.2023.v25i04.045

DEVELOPMENT OF FRUIT LEATHER BY BLENDING PAPAYA AND APPLE

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(Received 15 May, 2023; Accepted 20 August, 2023)

Key words: *Fruit leather, Papaya, Apple, Sugar*

Abstract– The present experiment entitled "Development of fruit leather by blending of Papaya and Apple" was carried out in food technology lab, department of Dairy technology, Sam Higginbottom University of Agricultural technology and science, during summer session 2022-2023. The experiment was laid out in Random block design (RBD) with 4 treatment and 5 replications. The different treatment combinations were prepared, i.e; T (100% Papaya + 0% Apple), T (90% Papaya + 10% Apple), T(80% Papaya + 20% Apple), T(70% Papaya + 30% Apple) During the preparation of fruit leather, papaya and apple pulp were added in ratio 100:0, 90:10, 80:20 and 70:30. Control sample was not added with Apple pulp. The treatments were evaluated for various organoleptic characteristic, physico-chemical parameters, nutritional value analysis and microbial evaluation. After sensory evaluation fruit leather having T1 (90:10) was found to have highest overall acceptability score of 8.70. On the basis of physico-chemical analysis the development of fruit leather sample has moisture content 17.78%, total solids (82.52%). Carbohydrate (78.21%), protein (0.53%), fat (0.47%), ash (1.65%), dietary fiber (2.14%) and acidity (1.14%) is highest. On the basis of minerals analysis shown vitamin-C (58.63%). On the basis of textural profile analysis hardness (8.98%), Cohesiveness (0.34%), Adhesiveness (3.34%), gumminess (4.64%) and chewiness (7.13%).

INTRODUCTION

Fruit leather or fruit bar or slab is a dried sheet of fruit pulp which has a soft leathery texture and sweet in taste, dehydrated product. It has a long shelf life and does not require refrigeration. It can be prepared from fresh pulp, frozen pulp or canned fruit. It is made by drying a very thin layer of fruit puree and other ingredients in cabinet drier, dehydrator in the form of leathery sheets Natural fruit pulp based on fruit bars are tastier and more nutritious since substantial quantity of dietary fibers, mineral, vitamins and other phytochemicals are present. Fruit leathers add value to fruits which may otherwise not be acceptable for the fresh produce market. Nutritionally rich and tasty blended fruit leather from fruits were papaya and apple. Fruit leather are the restructured fruit made from a concentration of mixture of fruit juices or fruit pulp and other materials after a drying process. The fruit leathers made of pulp are most widely preferred by the consumers as they consist of good quantities of carbohydrates, fibers, vitamins and minerals. Fruit leathers are dried and dehydrated products. These are chewy, tasty and dried fruit products. These are made by spreading the pulp on the stainless or aluminium trays and then drying or dehydrating them at a particular temperature such that the moisture content reaches up to 15-20%. The drying can be carried out by different methods like solar drying can be carried out by different methods like solar drying, cabinet drying, hot air drying, microwave oven drying, vaccum drying, freeze drying. After drying the leather in them peeled out from the trays and packed them. Because of its novelty and being more attractive in its form and on

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the other hand as it does not require refrigeration and so it was considered as the best way for incorporation of fruits solids and is mostly preferred by all ages especially for kids and adult. The leather also prepared from the leftover ripe fruits. Fruit leather is the fruit without moisture content in it. Many dehydrating techniques eliminate water or moisture content from the fruit pulp so that the product last long. It is economical that allows to buy fruits in bulk and ensures that it won't go bad.

PAPAYA (*Carica papaya)* is the fifth most important crop in India after mango, banana, citrus and guava. The fruit is an excellent source of vitamin A (2020 IU/100g). Papaya is the commercial fruit crop of western Madhya Pradesh, and available at cheaper rates during winter season. Unfortunately, papaya fruit has not caught the fancy of consumers as much as it deserves; mainly because its odour is not highly appealing which also limits its commercial exploitation at processing as level as papaya emits a sweet aroma which is pleasant and refreshing acidic in flavour. Therefore, the blending of fruit products could be an economic proposition to utilize them profitably. There is a good possibility of enchancing the flavour and acceptability of papaya products by diversification i.e. by using blending technology (Kalra *et al.,* 1991). The papaya fruit has pulp blood red colour, good taste, to give a quality product after blending. This shows their pulp compatibility and suitability for blending and making mixed fruit leather not only chemical but physical character too. It is common experience that 20-25% fruit is completely damaged and spoiled before it reaches the consumer (Yadav, 1997). Therefore, it is necessary to develop technology, for better utilization of such perishable fruit. Hence there is a great scope for processing of these fruits in the form of fruit leather. Papayas are an excellent source of vitamin C; one single medium fruit provides 224 percent of recommended daily intake. Papaya fruit is utilized in developing ready-to-serve drink, nectar, squash, sherbets, jam and candy slices.

APPLE (*Malus domestica)* Apples are one of the most consumed fruits worldwide and are consumed fresh or in processed forms such as jam, juice or dried (Masoud *et al.,* 2012). Apples contain over 84% water, a variety of vitamins (except vitamin B complex), minerals (K, Mg, Ca and Na), trace elements (Zn, Mn, Cu, Fe, B, F, Se and Mo) and have a high fiber content (Juniper *et al.,* 2002). Due to the varied and well-balanced composition of apples, they have the potential to prevent digestive cancers, colon and liver cancers, coronary heart disease, lung function disorder and asthma (Feliciano *et al.,* 2010). It is tougher to preserve fresh apples for a long period of time. Apple contained water content 84.7%, fiber 0.8%, carbohydrates 13.9%, protein 0.4%, lipid 0.3%, ash 0.3%, vitamin C 8mg, 57 kcal of energy per 100g of edible portion (Hussain, 2001). Apple, and especially apple peels, have been found to have a potent antioxidant activity and can greatly inhibit the growth of liver cancer and colon cancer cells (Wolfe *et al.,* 2003). Commercial production of apple jam is subjected to standard formulation of fruit pulp, sugar content, adjusted acidity and pectin content. It is processed to get ready juices, jams, jelly, canned apple slices and dehydrated apple slices, etc. In jam and jellies sugar stops growth of microorganisms and prevents spoilage, sugar holds water due to which shelf life of the product is increased (Clarke, 1997). Pectin being a gelling agent is responsible for gel information in the jam preparation (Fu and Rao, 2001). Stabilizing, thickening and textural characteristics are improved by pectin in different foods like jam & jelly, bakery products, confectionery and beverages.

MATERIALS AND METHODS

The present experiment entitled **"Development of Fruit Leather by Blending of Papaya** and **Apple"** was conducted in the Department of Food Technology, Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P) during the year 2022-23 materials to be used and methodology to be adopted during the course of study are mentioned below.

Materials: Fresh papaya and apple fruit were obtained from the local market of the Prayagraj.

Procedure: The procedure of manufacturing the papaya-apple fruit leather was followed as per the process given in the (Fig. 1). Different proportions were made in order to standardize the formulations. The standard formula for marking papaya-apple fruit leather has been given in (Table 1).

RESULTS

The result revealed that physico-chemical characteristics of fruit leather prepared from papaya and apple had the following performance.

Moisture

The maximum moisture (17.70) was observed in T

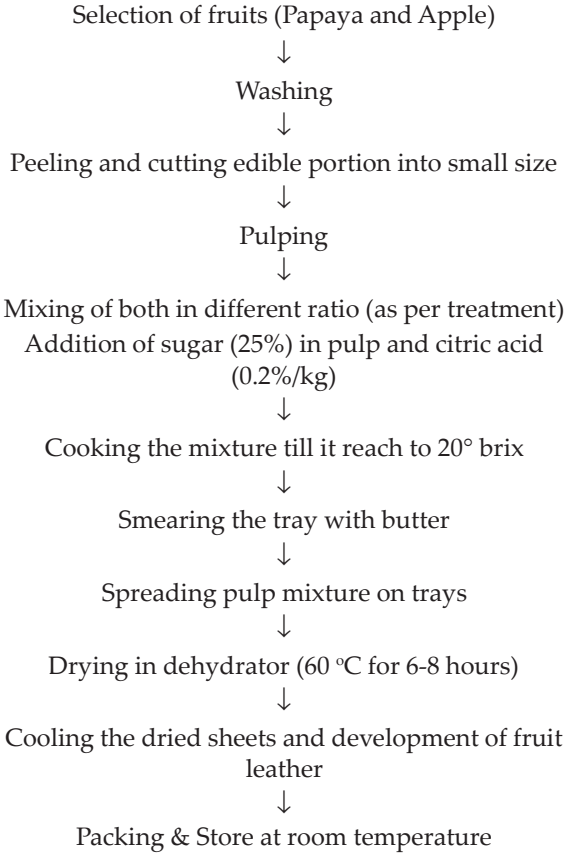

Fig. 1. Flow chart for preparation of papaya and apple leather

Table 1. Standard recipe for formulation of papaya-apple fruit leather.

Treatments	Ingredients	
	Papaya	Apple
T	100	-
T	90	10
T	80	20
T	70	30

papaya (70%) + apple (30%). Whereas moisture (16.54) was observed in T papaya (100%) +apple (0%).

Total solids

The maximum Total solids (83.48) was observed in T papaya (100%) + apple (0%). Whereas Total solids (82.30) was observed in T papaya (70%) +apple (30%).

Carbohydrates

The maximum Carbohydrate (79.33) was observed in T papaya (100%) + apple (0%). Whereas Carbohydrates (77.54) was observed in T papaya (70%) +apple (30%).

Protein

The maximum Protein (0.65) was observed in T papaya (100%) + apple (0%). Whereas Protein (0.37) was observed in T papaya (70%) +apple (30%).

Fat

The maximum Fat (0.68) was observed in T papaya (70%) + apple (30%). Whereas Fat (0.33) was observed in T papaya (100%) +apple (0%).

Ash

The maximum Ash (1.88) was observed in T papaya (70%) + apple (30%). Whereas Ash (1.43) was observed in T papaya (100%) +apple (0%).

Dietary fiber

The maximum Dietary fiber (2.53) was observed in T papaya (70%) + apple (30%). Whereas Dietary fiber (2.04) was observed in T papaya (100%) +apple (0%).

Acidity

The maximum Acidity (1.17) was observed in T papaya (70%) + apple (30%). Whereas Acidity (1.08) was observed in T papaya (100%) +apple (0%).

Nutritional Value

Vitamin-C

The maximum vitamin-c (58.93) was observed in T papaya (90%) + apple (10%). Whereas vitamin-c (58.03) was observed in T papaya (70%) +apple (30%).

Microbial Parameters

Standard plate count score (cfu/gm × 10^3)

The maximum standard plate count score (cfu/g ×10^3) (17.36) was observed in T papaya (90%) + apple (10%). Whereas standard plate count score (cfu/g ×10^3) (11.50) was observed in T papaya (70%) + apple (30%).

Coli form count (cfu/g × 10^3)

The coli form count (cfu/g × 10^3) in the sample of different experimental treatments and control was found to be absent.

Yeast and mould (cfu/g × 10^3)

The yeast and mould (cfu/g × 10^3) in the sample of

different experimental treatments and control was found to be absent.

Textural analysis

Hardness

The maximum Hardness (9.22) was observed in T papaya (70%) + apple (30%). Whereas Hardness (8.77) was observed in T papaya (100%) +apple (0%).

Cohesiveness

The maximum Cohesiveness (0.63) was observed in T papaya (70%) + apple (30%). Whereas Cohesiveness (0.24) was observed in T papaya (100%) +apple (0%).

Adhesiveness

The maximum Adhesiveness (5.46) was observed in T papaya (70%) + apple (30%). Whereas Adhesiveness (2.03) was observed in T papaya (100%) +apple (0%).

Gumminess

The maximum Gumminess (7.46) was observed in T papaya (70%) + apple (30%). Whereas Gumminess (2.48) was observed in T papaya (100%) +apple (0%).

Chewiness

The maximum Chewiness (7.34) was observed in T papaya (70%) + apple (30%). Whereas Chewiness (6.48) was observed in T papaya (100%) +apple (0%).

ORGANOLEPTIC PARAMETERS

colour and appearance

The maximum colour and appearance (8.02) wasobserved in T papaya (70%) + apple (30%). Whereas colour and appearance (7.82) was observed in T papaya (100%) +apple (0%).

Flavour and Taste

The maximum Flavour and Taste (8.44) was observed in T papaya (90%) + apple (10%). Whereas Flavour and Taste (6.82) was observed in T papaya (80%) +apple (20%).

Body and Textural

The maximum Body and Textural (8.78) was observed in T papaya (90%) + apple (10%). Whereas

Table 2. Table showing average data of different parameters of fruit leather

Physico-chemical parameter	TREATMENTS			
	T	**T**	**T**	**T**
Moisture %	16.54	17.48	17.58	17.70
Total solids%	83.48	82.52	82.42	82.30
Carbohydrate%	79.33	78.21	77.89	77.54
Protein%	0.65	0.53	0.45	0.37
Fat%	0.33	0.47	0.53	0.68
Ash%	1.43	1.65	1.76	1.88
Dietary fiber%	2.04	2.14	2.34	2.53
Acidity%	1.08	1.14	1.16	1.17
Nutritional analysis				
Vitamin-C	58.93	58.63	58.33	58.03
Microbiological analysis				
Standard plate count (cfu/g × 10^3)	11.50	14.56	15.54	17.36
Coliform count (cfu/g × 10^3)	-	-	-	-
Yeast and Mould (cfu/g × 10^3)	-	-	-	-
Textural analysis				
Hardness	8.77	8.98	9.14	9.22
Cohesiveness	0.24	0.34	0.46	0.63
Adhesiveness	2.03	3.34	4.68	5.46
Gumminess	2.48	4.64	6.50	7.46
Chewiness	6.48	7.13	7.23	7.34
Sensory Attributes				
Colour and Appearance	7.82	8.76	8.24	8.02
Flavour and Taste	7.32	8.44	6.82	7.12
Body and Texture	7.72	8.78	8.44	8.04
Overall Acceptability	7.20	8.62	6.46	6.26

Body and Textural (7.72) was observed in T papaya (100%) +apple (0%).

Overall Acceptability

The maximum Overall Acceptability (8.62) was observed in T papaya (90%) + apple (10%). Whereas Overall Acceptability (6.26) was observed in T papaya (70%) +apple (30%).

Cost analysis

The maximum cost analysis (Rs.25.1) was observed in T Papaya (70%) +Apple (30%). Whereas the minimum cost analysis is (Rs.23.6) was observed in T Papaya (100%) + Apple (0%).

CONCLUSION

According to the experimental results obtained during the study on the topic Development of fruit leather by blending of papaya and apple, it can be concluded from the result obtained that the fruit leather can be successfully prepared by using papaya and apple pulp. During the preparation of fruit leather, papaya and apple pulp were added in ratio 100:0, 90:10, 80:20 and 70:30. Control sample was not added with Apple pulp. Based on finding of the present experiment it is concluded that T papaya (90%) + apple (10%) was found superior in respect of the physico-chemical parameters like Moisture (%), Total solids (%), Carbohydrate (%), Protein (%), Fat (%), Ash (%), Dietary fiber (%), Acidity (%) and vitamin-c. With respective sensory attributes like colour and appearance, Body and Texture, Flavour and Taste and Overall acceptability also T papaya (90%) +apple (10%) was found as best.

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