

Development of reconstituted nutrispread by incorporation of date seed based composite powder

Desarrollo de nutrispread reconstituido mediante la incorporación de polvo compuesto a base de semillas de dátiles

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ABSTRACT

With growing concern there is a need to develop reconstitutable powder to produce different nutrient rich recipes. Therefore, the present work was undertaken to develop Reconstituted Nutrispread by utilization of Date seeds and Fig using tray dryer and study their influence on functional properties. The raw materials were dried using tray dryer and blended to create a homogeneous mixture, to which finely powdered coconut sugar was added to serve as a sweetener and binder. The mixture was further ground and sifted to achieve a smooth and consistent texture. The final product was a reconstituted date seed spread available in powdered form, which could be used in various ways, such as a spread or as an ingredient in different recipes. By utilizing raw materials such as dates, figs, almonds, and coconut sugar, this product is a healthier substitute for conventional spreads. Sample were analysed for Iron, Protein and Antioxidants. The results revealed that it contains 7.45g of iron, 15.59% of protein, 0.55% of fat. Keywords: Reconstitution, date seeds, iron, by-product utilization, sustainability, fig, tray dryer.

RESUMEN

Existe una creciente preocupación por la necesidad de desarrollar polvo reconstituible para producir diferentes recetas ricas en nutrientes. Por lo tanto, el presente trabajo se llevó a cabo para desarrollar Nutrispread reconstituido mediante la utilización de semillas de dátiles e higos usando un secador de bandeja y estudiar su influencia en las propiedades funcionales. Las materias primas se secaron usando un secador de bandeja y se mezclaron para crear una mezcla homogénea, a la que se añadió azúcar de coco en polvo fino para que sirviera como edulcorante y aglutinante. La mezcla se molió y tamizó aún más para lograr una textura suave y consistente. El producto final fue una semilla de dátil reconstituída para untar disponible en forma de polvo, que podía usarse de

varias maneras, como untable o como ingrediente en diferentes recetas. Al utilizar materias primas como dátiles, higos, almendras y azúcar de coco, este producto es un sustituto más saludable de las cremas para untar convencionales. Las muestras fueron analizadas en busca de hierro, proteínas y antioxidantes. Los resultados revelaron que contiene 7,45 g de hierro, 15,59% de proteína y 0,55% de grasa.

Palabras clave: Reconstitución, semillas de dátil, hierro, aprovechamiento de subproductos, sostenibilidad, higo, secador de bandeja.

INTRODUCTION

Spreads are concentrated foods with high nutritive value and have significant role in the nutrition of children, sports persons, and adults. Nut spread, is widely accepted by consumers due to its good flavour, nutritional value, and suitability for consumption either alone or in combination with a variety of other foods. Spread is a confectionary product based on powdered sugar, vegetable fat, cocoa powder, milk powder and other ingredients. Its physical and sensory properties are strongly influenced by the behaviour of the fat phase (Loncarevicet al., 2014). Spreads are concentrated foods with high nutritive value and are favourite in the 68 nutrition of children, sports persons and of adults (Raljic et al., 2013).

Date seed mostly contains dietary fiber, protein, carbohydrates, phenols, and minerals (potassium, magnesium, calcium, phosphorus, sodium, and iron). Such substances perform several functions from a biological point of view, such as antioxidant, antibacterial, and antiviral activities. It helps to prevent kidney and liver against toxicity or damage, useful in diabetes, rich in antioxidants, prevents DNA damage and helps to fight various viral infections. (Hosa, M. Habib & Wissam H. Ibrahim 2008). In the present study the sweetening agent was coconut pal sugar. A study done on coconut sap sugar and syrup found that both products have low glycemic index (GI) of 35 and 39, respectively. Low GI foods are health beneficial because they can control rise in blood glucose and may have a significant role for risk of diabetes mellitus and obesity. (Trinidad P. Trinidad et al.).

Reconstitution of powdered ingredients is of particular importance to both manufacturers and consumers as a target of consumption quality (Fang et al., 2011). Reconstitution is highly dependent of both operating conditions and material properties. The objective is to restore the fresh product functional properties, especially for heat-sensitive food products such as vegetables and fruits powders (Lopez-Quiroga et al., 2019). Reconstitution of food powder generally consists of four steps or phases: wetting of powder particles, sinking, dispersing, and particles completely dissolving in solution (Forny et al., 2011; Mitchell et al., 2015). Wetting is the first step where the particles contact liquid, the physicochemical properties of particle surface is of major importance for improving initial step. Dispersing and dissolution are the critical phases where primary particles start to release materials from the particle surface into the liquid. Once any of these steps is limited, the time for the whole reconstitution is prolonged. Particularly, in the case of fruit powders, the dissolution cannot be fully achieved due to the presence of many

insoluble polysaccharides. Additionally, different steps can overlap that makes understanding the global rehydration process more complicated (Schubert, 1993).

MATERIAL AND METHODS

Development of raw materials: Commercially available high-quality dates were procured from local vendors. Dates were separated manually for acquiring seeds and the fruit. Almonds, figs were also collected from local market. The process of separating and sorting date seeds is done manually followed by thorough washing and cleaning procedure that includes the removal of the outer layer. The seeds are subsequently weighed, and roasted in a microwave at 150°C for a period of 20 minutes. Once the roasting process is completed, the seeds are re-weighed and subjected to drying using tray drier at 150°C for 1 hour. Subsequently, the dried seeds are finely ground into a powder using a grinder.(Fig.1) In the processing of dates and figs, the initial step involves sorting and cleaning of the fruits. The fruits are then cut into smaller pieces to facilitate the drying process. After this, the fruits are further dried in a tray drier at a temperature of 80°C for approximately 8 hours. Finally, the dried fruits are ground into a fine powder. (Fig. 2) The processing of almonds, the almonds undergo a sorting and cleaning process. They are then subjected to a soaking period of approximately 2 hours to facilitate the removal of their outer skin. After the soaking process, remaining water content is removed using a muslin cloth. Subsequently, the almonds are roasted in a pan, followed by a microwave roasting process at a temperature of 150°C for a duration of 20 minutes. Following the roasting process, the almonds are dried in a tray drier at 150°C for 1 hour and ground into a fine powder. This careful process results in high-quality almond powder. (Fig. 3)



Fig No: 1

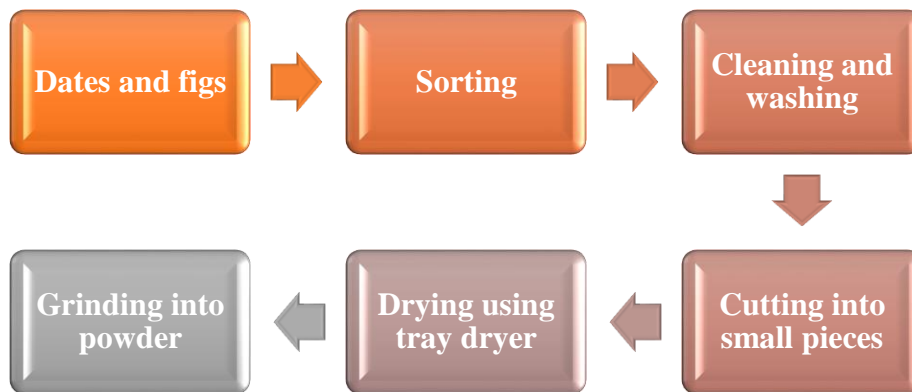


Fig No: 2



Fig No: 3

Development of multimix: The process involves preparing a mixture of raw materials including date seeds, dates, figs, and almonds, which are finely ground to create a homogeneous blend. To this mixture, finely powdered coconut palm sugar is added, which acts as a sweetener and helps to bind the ingredients together. (Fig. 4)

The mixture is then further ground using a grinder to achieve a fine and uniform texture. However, the resulting mixture can be slightly grainy, which may not be desirable in the final product. Therefore, the mixture is passed through a sieve to remove any lumps and achieve a smooth and even consistency. The final product can be

considered as a multimix, used in a variety of ways, such as a spread, energy drink, energy powder or as an ingredient in various recipes, owing to its unique texture and taste. (Fig. 5) The use of raw materials such as dates, figs, almonds, and coconut sugar make this product a healthier alternative to conventional spreads.

Nutritional evaluation: The developed instant mix was analysed for the moisture content, protein content, fat, iron and antioxidants.

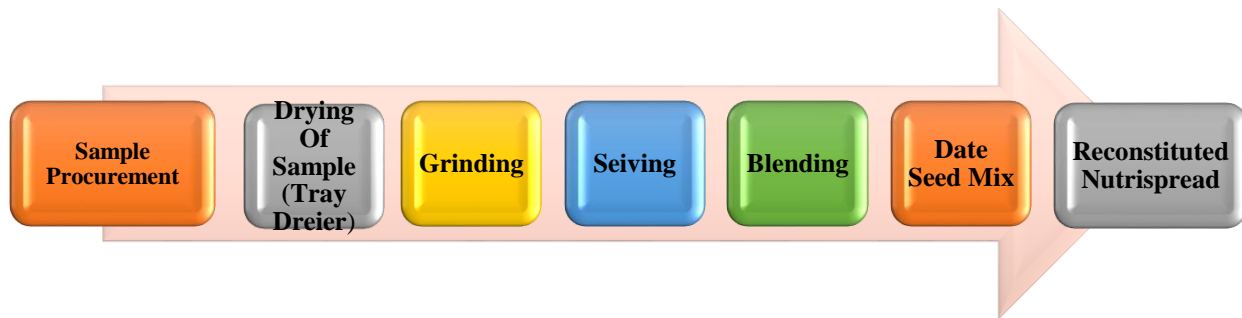


Fig No: 4

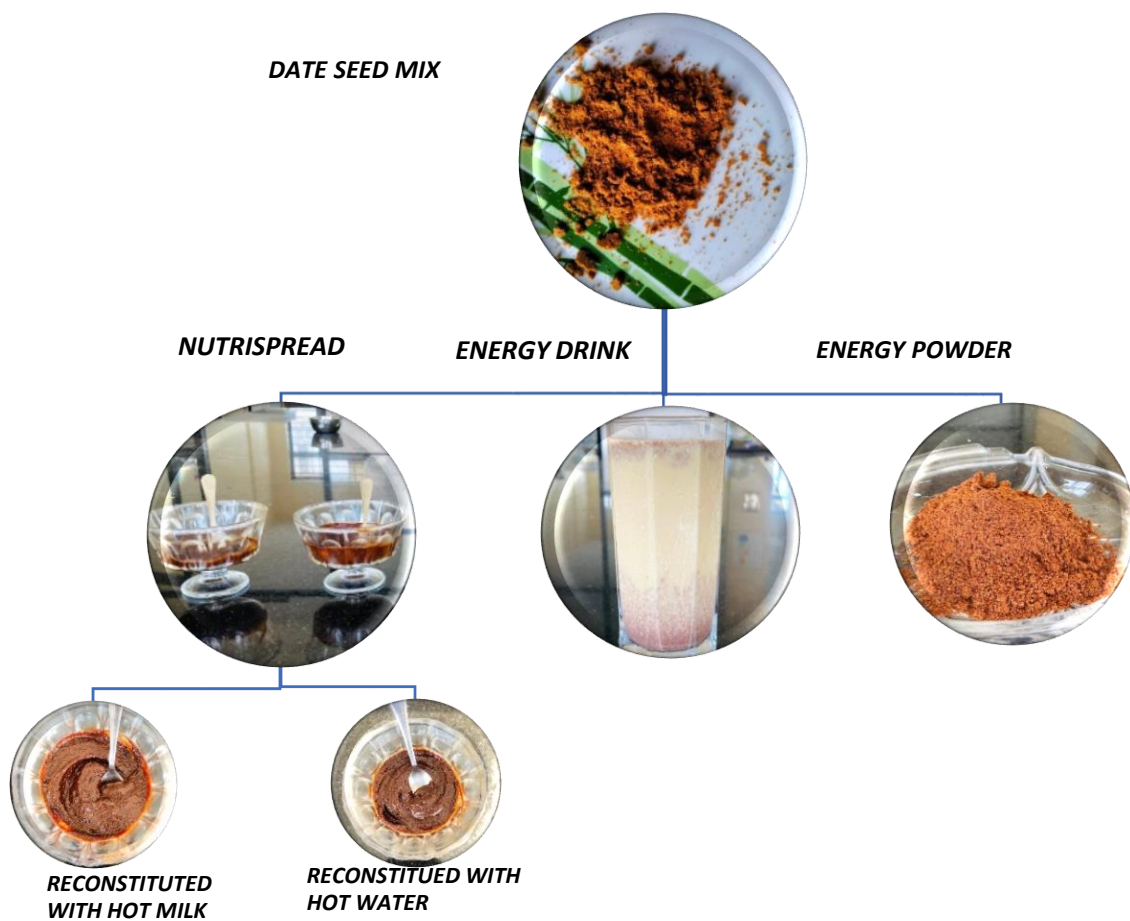


Fig No: 5



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Date of Issue : 23.03.2023
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Issued To: Ms. Namitha Anil B. Voc. Food Processing Technology St. Teresa's College Ernakulam	Sample Code : FQLAB/22-23/1132/C2194 Sample Receipt : 06.03.2023 Date of Analysis : 07.03.2023 - 21.03.2023 Reported Date : 21.03.2023
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Particulars of sample	: Dates Seed Spread
Condition of Sample	: Received in good condition
Customer Sample ID	: Nil
Sample Quantity	: 450g
Sample Drawn by	: Customer
Sample Description	: Date seed spread

TEST RESULTS

SL NO.	PARAMETERS	UNIT	TEST METHOD	RESULT
1	Iron	mg/100g	AOAC 21 st Edn, 2019; 944.02	7.45
2	Protein	%	AOAC 21 st Edn, 2019; 920.87; Ch. 32	15.59
3	Total fat	%	IS 12711 : 1989 (RA 2015); Ch.10	0.55
4	Tertiary butyl hydro quinone (TBHQ)	mg/Kg	AOAC 21 st Edn, 2019; 983.15 Ch. 47.2.02	BUQ(LOQ-20)
5	Butylated Hydroxy Anisole (BHA)	mg/Kg	AOAC 21 st Edn, 2019; 983.15 Ch. 47.2.02	BUQ(LOQ-30)
6	Butylated Hydroxy Toluene (BHT)	mg/Kg	AOAC 21 st Edn, 2019; 983.15 Ch. 47.2.02	BUQ(LOQ-20)

Remarks: BUQ - below Limit of Quantification, LOQ - Limit of Quantification

No. of parameters tested: 6
 ***** End of the Report *****

For FQLAB AND RESEARCH CENTRE (P) LIMITED


 MUKIL MANOJ
 Sr. Technologist
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FORM 2

Fig No: 6

RESULT AND DISCUSSION

Nutritional evaluation: Figure 6 unfold the data nutritional contents of developed instant mix. There was a 15.59% of protein were observed. (AOAC 21st Edn.2019) Result of the fat analysis by using Soxhlet method of sample were 0.55%. (IS 12711 : 1989) Although addition of nutrient rich ingredients might be the result of low fat. It is well known that iron deficiency can cause consequences in human being. From ancient times, man has recognised the special role of iron in health and disease. Iron is an abundant element on earth, it is biologically essential component of every living organism. Iron deficiency anemia arises when the balance of iron intake, iron stores, and the body's loss of iron are insufficient to fully support production of erythrocytes. Iron deficiency anemia rarely causes death, but the impact on human health is significant. (Jeffery L. Miller 2013)

The iron content of final sample was assessed by using dry ashing method. 7.45 mg/100 g of iron were obtained. (AOAC 21st Edn.2019) The recommended Dietary Allowance (RDA) for all age groups of men and menopausal women is 8 mg/day. Hence, the present study meets the same. Incorporation of dates, date seeds and almonds might be the reason of high iron content. After conducting a thorough analysis of the composition of antioxidants in the date seed powder, Tertiary Butyl Hydroxy Quinone (TBHQ), Butylated Hydroxy Anisole(BHA), Butylated Hydroxy Toluene (BHT) were determined by using HPLC method. (AOAC 21st Edn.2019) The findings of present study indicates that the powder mixture possesses antioxidant value falls below the required limit. The lower level of the antioxidants was observed in samples might be due to the high temperature during the processing. Spray drying can be used instead of tray drying to reduce the degradation of antioxidants during processing. Spray drying is continuous in operation and ideal for heat-sensitive products because of its short drying time. In this process, hot air enters the drying chamber, evaporating the moisture from sprayed liquid, reducing the air temperature as it passes through the chamber. (Rajeshree A. Khaire et. al 2019)

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