UTILIZATION OF DATES TO SUBSIDIZE SUGAR IN THE PRODUCTION OF BREAD AND OTHER SNACK

BY

YUNUS USMAN

HND/23/HMT/FT/0084

BEING A RESEARCH WORK SUBMITTED TO THE DEPARTMENT OF HOSPITALITY MANAGEMENT TECHNOLOGY, INSTITUTE OF APPLIED SCIENCES KWARA STATE POLYTECHNIC, ILORIN
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF HIGHER NATIONAL DIPLOMA (HND) IN HOSPITALITY MANAGEMENT TECHNOLOGY

JUNE, 2025

CERTIFICATION

This is to certify that this project has been read and approved as meeting the partial requirements for the award of Higher National Diploma (HND) in Hospitality Management, by the Department of Hospitality Management, Institute of Applied Sciences, Kwara State Polytechnic, Ilorin.

_____	_____
MRS. AREMU O.O (PROJECT SUPERVISOR)	DATE
_____	_____
MRS. HARUNA, Z.A.B (PROJECT CO-ORDINATOR)	DATE
_____	_____
MRS. AREMU O.O. (HEAD OF DEPARTMENT)	DATE
_____	_____
EXTERNAL EXAMINER	DATE

DEDICATION

This work is dedicated to Almighty Allah for the life He gave to me an insight to carry out this work successfully. It is also dedicated to my dad Mr. Yunus Ayinla,, my mum Mrs. Adijat Aduke and Mr Muniru Alani.

ACKNOWLEDGMENTS

Glory be to Almighty Allah, the Omnipotent, Omniscience, for His awesomeness and kindness throughout the period of this research work and my staying in school.

My sincere appreciation goes to my able Supervisor and HOD, MRS AREMU O.O, whose correction and criticism have being of great importance and to my other lecturers in and outside of my department, who impacted knowledge in me; may Almighty Allah, enrich you all (AMIN). Also, my gratitude goes to my able Project Coordinator MRS. HARUNA Z.A.B.

My gratitude also goes to all the lecturers of the department: Mrs. Adebayo S.M., Mrs. Adewumi G,.O., Mr. Abdulateef Olatunde, Mrs. Hassan Kudirat, Mrs. Aiyedun F. and others

My unreserved gratitude goes to my beloved parent: my dad Mr Yunus Ayinla , my mum Mrs. Adijat Aduke and Muniru Alani, for their effort and support towards the success in education.

Mr. gratitude also goes to my friends: Sodiq and Naheem, whose endurance and friendship led to the successful completion of this project work; thank you so much and to others who were not mentioned. May God reward you abundantly.

Thank you all.

ABSTRACT

The project explores the utilization of dates (Phoenix dactylifera) as a natural sweetener and functional ingredient in the production of bread and snacks. Dates are rich in essential nutrients, including natural sugars, fiber, vitamins, and minerals, making them an ideal substitute for refined sugars and artificial additives in baked goods. The study investigates the effects of incorporating date paste and date syrup into bread and various snack formulations on their nutritional content, taste, texture, and shelf life. The research involved experimenting with different concentrations of date products in bread dough and snack mixtures, analyzing their impact on the physical and sensory properties of the final products. Nutritional analysis was conducted to assess the enhancement in dietary fiber, antioxidant content, and overall energy value. Sensory evaluations, including taste tests, were performed to determine consumer acceptance and preferences. Preliminary results indicate that date-enriched bread and snacks exhibit improved nutritional profiles and are well-received by consumers, with enhanced flavor and natural sweetness. The study concludes that dates can be effectively utilized as a health-promoting ingredient in the bakery industry, offering an alternative to traditional sweeteners and contributing to the development of more nutritious and appealing food products.

TABLE OF CONTENTS

CHAPTER FIVE

CHAPTER ONE

BACKGROUND TO THE STUDY

1.1 Introduction to the Study

Date palm tree, Phoenix dactylifera, is one of the oldest cultivated plants, and the main staple and ancient crops are grown in many regions; in southwest Asia, North Africa, Australia, Mexico, South America, and in southern Africa (Choo and Krueger 2017; Al-Harrasi et al. 2014; Hazzouri et al. 2018). Due to its high tolerance of aridity and very harsh chinmatte conditions, date palm tree invaluably provides the people in those regions a nutritious food source and environmental protection (Daoud et al. 2019; Kalbounch 2011). The date fruit is known to be nutrient-rich (Chao and Krueger 2017) Ita good source of carbohydrates (approximately 70%, in the forms of fructose and glucose), dictary fibers (predominants insoluble fibers), proteins, and minerals (Al-Harrasi et al. 2014; Siddiq 2014; Eoin 2016). It is also rich in phenolic acids, flavonoids, procyanidins, carotenoids, and sterols (Baliga et al. 2018; Gheisari, et al 2020).

Date palm (Phoenix dactylifera L..) has long been one of the most important fruit crops in the arid regions of the Arabian Peninsula, North Africa, and the Middle East. During the past three centuries, dates were also introduced to new production areas in Australia, India/Pakistan, Mexico, southern Africa, South America, and the United States. Dates are a main income source and staple food for local populations in many countries in which they are cultivated, and have played significant roles in the economy, society, and environment of those countries.

Date is one of the oldest known fruit crops and has been cultivated in North Africa and the Middle East for at least 5000 years (Zohary and Hopf, 2018). The carliest record from Iraq (Mesopotamia) shows that date culture was probably established as early as 3000 BCE. Because of the long history of date culture and the wide distribution and exchange of date cultivars, the

exact origin of the date is unknown, but it most likely originated from the ancient Mesopotamia area (southern Iraq) or westem Indis (Wrigley, 2019). From its center of origin, date cultivation spread throughout the Arabian Peninsula, North Africa, and the Middle East. Date culture had apparently spread into Egypt by the middle of the second millennium BCE. The spread fate cultivation later accompanied the expansion of Islam and reached southern Spain and Pakistan. The Spanish were the fir introduce date palms outside the Arabian Peninsula, North Africa, and the Middle East/South Asia, carrying them to Αμστημα (Nixon, 2019). Date cultivation has had a very important influence on the history of the Middle East.

Without dates, no large human population could have been supported in the desert regions. The caravan routes existed for centuries mainly for the transportation of dates. Early on, date cultivation became a sacred symbol of fecoddy and fertility. Dates had great spiritual and cultural significance to the people of the Middle East. Date palms and culture are depicted in ancient Assyrian and Babylonian tablets, including the famous Code of Hammurabi, which contained laos pertaining to date culture and sales. References relating to date palms are also found in ancient Egyptian, Syrian, Libyan and Palestinian writings (Nixon, 2019; Popenoe, 2019).

The date palm (Phoenix dactylifera L.) is the type species of the genus Phoenix. Phoenix species are native to South Asian and African regions with tropical or subtropical climates. Some Phoenix species are short statured with very w trunks, whereas other species may be over 30 m tall, and different species may have a single trunk or clumped multiple trunks Phoenix is feather leafed palms with a terminal leaflet and all leaflets having a central fold or ridge that causes the leaflets to remain erect. Hasal leaflets are modified into spines. Phoenix species are dioecious, with separate staminate and es on both staminate and pistillate trees arise from lateral meristems

among the leaves. The three- flowers are small, single, and pale yellow, with the sepals united into a cupale.

Female flowers have three carpelse, one of which matures into a fruit while the other two dehisce. Male flowers generally have six stamens. The fruits are drapes, with a single grooved seed.

On average of 5 years after propagation, date fruit can be obtained from a female tree, yielding 400-600 kg/tree annually (Al Alawi et al, 2017) Date fruit is being harvested and marketed depending on the cultivar at three developmental stages (Fig 1), which include Khalal (mature firm), Rutab (soll brown), and Lamr (hard raisin-like) (Awad 2007, Glanner et al 1999).

During cultivation, different ripening stages are found within the same cluster, including immature dates (Lobo, et al 2013). Thus, date production generates substantial fruit losses (approximately 30%) during picking, storing, or conditioning the fruits. Due to the large quantity of second grade date, together with other inedible parts combined at harvesting, it would be beneficial for farmers and the food industry to valorize this by-product by utilizing its nutritional value into value added products, which at the same time is beneficial to the environment

Bread is one of the most widely consumed food products in the world. flaking technology has developed gradually as new materials, equipment and processes are advancing (Selomulyo and /Zhou. 2017). The impacts of various ingredients on sensory and nutritional quality of bread have been widely studied (Plessas et al., 2018)

Bread is conventionally produced from flour Bread is also made, though to a lesser extent, from the flour of other wheat species including I durum, I dicocum and 1 spelta (Komlaga et al., 2018). Bread has now become one of the most widely consumed foods in the world. Bread is an important staple food both in the developed and developing world (Abdelghafor et al., 2019). In

India, bread has become one of the most widely consumed non indigenous food (Das et al. 2012) whereas in Nigeria, bread has become the second most widely consumed non-indigenous food after rice (Shittu et al., 2018). The rapid urbanization, increasing population and changing food habits have resulted in the preference for convenient foods such as bread, biscuits, and other baked products (Oyewole et al, 2019). Bread is normally made from wheat flour dough that is cultured with yeast, allowed to rise, and baked (Komlaga et al 2018), the unique bread making properties of wheat flour are attributed mainly to the ability of its gluten to form a viscoelastic network when mixed with water (Defloor et al 2019).

Studies have shown that snacks can be used to increase the nutritional status of consumer by incorporating nutrient such as protein and fibre from plant sources which have health benefits (Zazueta Morales et al 2021), Wheat (Triticum spp.) is one of the major grains in the diet of a vast proportion of the world's population. It has therefore a great impact on the nutritional quality of the meals consumed by a large number of people and consequently on their health. Although wheat's ability to produce high wields under a wide range of conditions is one reason for its popularity compared to other cereals, the most important factor is the capability of wheat platen proteins to form viscoelastic dough, which is required to bake leavened bread in particular. These gluten proteins are necessary for the production of the great variety of foods associated with wheat around the world. The total annual production of wheat for year 2016 as at June is put at 724 million metric tones (FAO/WHO. 2016).

Snacks are important foods which come in a variety of forms including packaged stuck foods and other processed food as well as items made from fresh ingredients at home, the consumption of which is steady and increasing in Nigeria. it is a portion of food, smaller than a regular meal, generally eaten between meals. It has been hitherto produced from wheat as a

major raw material. In Nigeria, wheat production is limited and wheat flour is imported to meet local flour needs for bakery products as such huge amount of hard earned foreign exchange is used every year for importation of wheat.

1.2 Statement of the Problem

For the past decades, increasing population, urbanization and changing food habits has led to an increased demand for flour convenient foods in many developing countries. However, as some flour is not grown in countries with tropical climate, they have to rely on expensive imports paid with foreign exchange. Also the continuous use of flour in bread production and snacks production is faced with the development of celiac (coeliac) disease. On the other hand, sugar is used by man for many purposes such as bread and beverages production, snacks production. Sugar has got limited use in some areas since has become expensive as demand is high. The use of chemicals and preservatives during sugar processing may significance health effect to consumers. The effects may include allergies, carcinogenic effects increase in body weight and cardiovascular diseases (Bray, 2019).

With rising flour prices on the global market and development of celiac disease due to flour consumption, there is an interest to promote utilization of local sources of flour for partial substitution of wheat flour in food products in order to lower the dependency to wheat imports and also to increase livelihoods of local farmers. Also, to find a substitute for sugar which is one of the main component used in the bread and snacks making industry.

1.3 Objectives of the Study

The General objective of the study is the utilization of dates in the production of bread and other snack. Other specific Objectives are:

-To examine the health benefits of date in human health

-To investigate other uses of date apart from sugar replacement.

-To produce bread and snacks using date as sweetener.

1.4 Significance of the Study

The research is very significance because it enlighten the general populace on the various constituents and uses of dates honey in bread and snacks making, the health benefits of date will be analyzed and examine. The study also investigates some of the aforementioned benefit in other to prove to the Nigerian populace the various importances mentioned above.

The study is also very important because it encourages government and other stakeholders to invest more in Date farming in Nigeria. Finally, the research project serves as an eye opener to the researcher because it increases the researcher's knowledge on the importance of date in general.

1.6 Scope of the Study

The project work is limited to the utilization of date in the production of bread and snacks. This study will be limit to the production of bread and snakes only using Dates.

1.7 Limitation of the Study

In caring out this research project, the researcher encounter the following inhibitions:

-Financial constraint- Insufficient fund tends to impede the efficiency of the researcher in sourcing for the relevant materials, literature or information and in the process of data collection (internet, questionnaire and interview).

-Time constraint- The researcher will simultaneously engage in this study with other academic work. This consequently will cut down on the time devoted for the research work.

1.8 Definition of Terms

- ✓ Phoenix dactylifera: commonly known as date palm, is a flowering plant species in the palm family, Arecacese. cultivated for its edible sweet fruit called dates.
- ✓ Sucrose sugar: Sucrose, a disaccharide, is a sugar composed of glucose and fructose subunits. It is produced naturally in plants and is the main constituent of white sugar.
- ✓ Bread: Bread is a staple food prepared from a dough of flour and water, usually by baking. Throughout recorded history and around the world, it has been an important part of many cultures diet.
- ✓ Production: Production is the process of combining various inputs, both material and immaterial in order to create output. Ideally this output will be a good or service which has value and contributes to the utility of individuals
- ✓ Hospitality Industry: The hospitality industry is a broad category of fields within the service industry that includes lodging, food and drink service, event planning, theme parks, travel and tourism. It includes hotels, tourism agencies restaurants and bars.
- ✓ Baking: baking, process of cooking by dry heat, especially in some kind of oven. It is probably the oldest cooking method. Bakery products, which include bread
- ✓ Wheat flour: Wheat flour is a powder made from the grinding of wheat used for human consumption. Wheat varieties are called "soft" or "weak" if gluten content is low, and are called "hard" or "strong" if they have high gluten content
- ✓ Snacks: A snack is a small portion of food generally eaten between meals. Snacks come in a variety of forms. including packaged snack foods and other processed foods, as well as items made from fresh ingredients at home.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

2.1 Worldwide Production Of Date Palms

Dates can grow in very hot and dry climates, and are relatively tolerant of salty and alkaline soils. Date palms require a long, intensely hot summer with little rain and very low humidity during the period from pollination to harvest, but with abundant underground water near the surface or irrigation.

One old saying describes the date palm as growing with "its feet in the water and its head in the fire. “Such conditions are found in the cases and wadis of the date palm's center of origin in the Middle East. Date palms can grow from 12.7 to 27.5 C average temperature, withstanding up to 50 C and sustaining short periods of frost at temperature as low as 5 C. The ideal temperature for the growth of the date palm, during the period from pollination to fruit ripening, ranges from 21 to 27 C average temperature. Dates are widely grown in the arid regions between 15N and 35N, from Morocco in the west to India in the east (Zaid and de Wet, 2019).

2.1.1 Cultivation Of Date Palms

The average economic life of a date garden is 40 to 50 years, but some are still productive up to 150 years. There are a few date palms that are probably several hundred years old. Because of the biology of the date palm, its cultivation number of unusual features that are not common in other perennial crops. There are a number of cultural practice this require access to the crown of the tree, and in old trees reaching tens of meters in height, this can be challenging and sometimes

dangerous. The crown of the tree needs to be accessed for pollination, bunch tie-down, covering, harvesting, pruning.

Although the practice of climbing the trees for access to the crown in still found in all date-producing art of mechanical lifts is common in more advanced or industrialized production areas, such as the Limited State Carpenter, 2019) Date is wind pollinated in nature, but insect pollination is possible. Commercially, few male trees are grow gardens, and pollen is collected for the artificial pollination that is critical for the success of production. Artificial policies has been practiced in North Africa and the Middle East for thousands of years. Pollination of 60% to 80% of the female flowers results in adequate fruit set. Cultivars differ greatly in their fruit set percentage. Incompatibility or panel incompatibility between different female and male cultivars is common but not well understood. Only one ovale per flowers fertilized, producing a single fruit (Nixon and Carpenter, 2017; Zaid and de Wet, 2019).

Different pollen sources can influence the size and shape of the seeds ("xenia" effect) Pollen also can "metaxenia" effect, influencing the tissue outside the embryo and endosperm (Nixon, 2019). As an example of metaxe effects in date palms, Nixon (2019) reported that "Fard No. 4" consistently produced earlier but smaller fruit than the averoγε of all pollen sources studied, whereas "Mosque' consistently produced larger but later fruit than the average. Pollination with pollen from different Phoenix species also exhibited metaxenic effects (Nixon, 2019). Although similar effects have reported from various other countries, in some cases no observable effects were reported from pollinations with pollen different males tested. This has been attributed to the fact that metaxenic effects are less pronounced when conditions are favorable (i.e., higher heat units) or the possibility that the specific males tested did not produce metaseme effects (Reuveni, 2018).

2.1.2 Pests And Diseases Of Date Palms

Date palms are afflicted with many diseases and pests, but the nature and severity of the problems vary with cultivar location, weather, and cultural practices (Carpenter and Elmer, 2019). Most reported diseases of date palm that can he associated with a pathogen are attributed to fungi. However, there are several recent reports of phytoplasma-associated disorders.

One of the most serious fungal diseases in North Africa is the Bayoud disease incited by Fusarium oxysporuma spalbedinis. This disease has caused large losses of date palms, and research concerming Bayoud is one of the most important areas of date palm research. Various insects attack date palms, but specific insect problems vary with geographic area. Chemicals, biological control, pheromone trapping, quarantine, and sanitation practices are used to control insect pests of date palms (Howard et al, 2018). An emerging pest of date palm during the past decade is the red palm weevil, which has spread from India to North Africa, the Middle East, and southern Europe. Weed control is usually achieved by herbicide application or, in few developed areas, by hand weeding.

2.1.2 Uses Of Dates And Date Palms

Date palms produce many products that are useful to humans. The primary product is the date fruit, which can be eaten fresh, dried, or in various processed forms, In North Africa and the Middle East, some dates are harvested and consumed during the Khalal stage, when the fruit are still very astringent with a high tannin content (Dowson and Ateo, 20161. However, most dates are harvested during the fully ripened Rutab and Tamar stages, when they are high in sugar and lou in moisture and tannin. Cultivars of dates can be classified into "soft," "semidry." or "dry" dates, depending upon the time of harvest and associated water content. Some cultivars are used in more than one manner. Fruit quality is influenced by size, color, texture, cleanliness, freedom

from defects (sunburn, insect damage, sugar migration to surface, fermentation), and the effects of decay-causing pathogens. Date fruit are available in different forms, including whole pitted and unpitted dehydrated pieces, diced, extruded date pieces, and macerated fruit. Dates can be used in cereal, pudding, bread, prewed cakes, cookies, candy bars, ice cream, and date shakes (a California specialty). Date fruit also can be made into juice, vinegar, wine, boer, sugar, syrup, honey, chutney, pickle, paste, dip, and food flavoring (Barreveld, 2019).

Date fruit are high-energy food sources with 72% to 88% sugar content at maturity. During the Khalal stage, nearly all (80% to 85%) of the sugar is sucrose. As ripening progresses, the sucrose is hydrolyzed into reduced sugars glucose and fructose. Date fruit are good sources of iron and potassium; a fair source of calcium, chlorine, copper, magnesium, and sulfur, and a minor source of phosphorus. In addition, dates are a source of 16 amino acids and vitamins A, 131, and B2 (Ahmed et al., 2019; Vandercook et al., 2018).

2.2 Dietary fibers

Dates are a rich source of fibers, with fiber content varying between 60 and 80 g/100 g total weight (Habib and Ibrahim, 2019). As lignocellulosic biomaterial, the insoluble fiber content consists of cellulose, hemicellulose, and lignin and content of these varies between 20.0 and 46.8 g/100 g. between 17.5 and 55.0 g/100 g, and between 11.0 and 30.6 g/500g Collectively (Abu- Thabit et al, 2020), Soluble fiber content in date is very low at 5 g/100 g dates while insoluble fitness content is 53/100 g dates (Goksen et al., 2018). All soluble fibers from various plant sources are commonly used in food products, such as bakery products and breakfast cereals (Hu et al, 2019), Fiberst search are commonly used in food products to other fruit byproducts as All 2017nt for fats in certain food products, such as chicken sausages and various types of ice cream (De Merises Crivel al..

According to the American Dietetic Association, the recommended range of fiber intake is between 25 and 30 day at a 3:1 ratio of insoluble to soluble fiber for adults (Sofi et al., 2017). Meat products are usually rich in fat and protein, bul deficient in complex carbohydrates (ie., dietary fiber). Additionally, agricultural by-products and waste products are a cheap source of dietary fiber, and their incorporation into meat products at varying levels reduces cost and adds functionality fat replacers simulate the eating qualities of foods that are high in fat, preserving a smooth texture and mouth-fect Since dates are primarily a polysaccharide biomaterial, they could be used as carbohydrate-based fat replacers in a similar way to the food industry's typical use of starch, gum, and cellulose of plant origin. The relevant products could incele imitation cream, margarine, salad dressings, sauces, frozen desserts, baked goods, and processed meats (Wang et al., 2022) Fibers from dates have also been used in the development of edible costings for foods. Hydrocolloids and phenolic compounds extracted from dates have been claimed to reduce oil uptake in potato strips during deep-fat frying at a relatively low content ratio (ie., <5%); at this ratio, they are still able to reduce oil uptake by over 70%, which is higher than the reduction achieved in earlier attempts (Mousa, 2016). The principle of using dates as a hydrocolloid-based coating is reliant on their fiber content, as this is similar to resistant starch. Likewise, starchy gum coatings are used in food processing to improve the functional properties of products, such as their viscosity, water-binding capacity, and emulsion stabilits (Williams and Phillips, 2021).

2.2.1. Oil content

The oil content of dates depends on factors such as date palm variety, growing conditions, and method of extraction, it has been found lo vary between 3.9 and 13.8 g/100 g (Habib and Ibrahim, 2019). The oil extracted from dates is considered to be a rich source of unsaturated fatty acids, primarily oleic acid (which occurs at 39,5-554 g/100 g of oil; Ashrat and Hamidi-Esfahani,

2017). Other unsaturated fatty acids occurring in dates are linoleic acid (6.2-19.8 g/100 g of oily and linolenic acid (0.3-8.1 g/100 g of oil; Basuny and Al-Marzooq, 2017; Lieb et al., 2020). In contrast, the saturated fatty acid content of dates consists primarily of lauric (6.793-45.4 g/100 g of oil), palmitic (2.64-12.6 g/100 g of oil), stearic (47.9 g/100 g of oil), capric (0.25-11 g/100 g of oil), myristic (0.04-12.8 g/100 g of oil), and arachidic (0.02-0.39 103 oil) acids (Rahman, 2007; Ataye et al., 2016). This means that dates can be considered to be a valuable source of edible and pharmaceutical oils (Saafi et al., 2018).

2.2.2 Protein content

According to the literature, the protein content of dates can vary between 4.8 and 12.5 g/100 g (Alyileili et al, 200) This consists primarily of soluble proteins, such as globulin, albumin, prolamin, and glutelin. Proteins of plant origin can be used as substitutes for those of animal origin, which are normally higher in cost and are less sustainable. Because high abundance, proteins of plant origin are generally more appealing. However, the extraction of plant proteiosis difficult and might disrupt their functional properties (Schutyser and Van Der Goot, 2017). In the case of date, the protein extracted has been investigated for potential use as an emulsifying agent (Akasha et al., 2016). However, it is crucial te determine whether this protein can be extracted cost-effectively.

2.3 Applications of dates in foods

2.3.1. Food products

Research results on the applications of dates in foods of various categories have been reported in the literature over the course of more than four decades. Drawing on this body of research, 14% of the studies included in this review relate to the use of dates in hot drinks (ie., products similar to caffeine-free coffee), 36% relate to bakery products, and 14% to meat

products. Dates have long been used to prepare drinks, mainly similar in nature to Arabic coffee, due to their abundance and low cost in the Arab region. More recently, researchers have explored whether dates, as a rich source of fiber, could he suitable for use as an additive in bakery products. This application in fortification has subsequently progressed to their use in the enhancement of other functionalities beyond traditional nutritional enrichment. Examples of the functionalities of dates include their use to enhance consumers perceptions of a product's physical and textural properties (Bouaziz F, et al., 2020), as a fat replacer (Alqattan et al., 20211 and as a natural meat tenderizer (ie, to enhance sensory juiciness, texture, and taste; Nor et al., 2018).

Recently, dates have been used in more innovative ways, such as in the formulation of biodegradable edible coatings that can enhance shelf life, and in the production of low-fat products via reduction of oil uptake during the frying process Table 2 illustrates the set of food products that have been fortified with dates. They are grouped into various food catego and by the form of dates used and the level at which they are added.

2.3.1 Dates in beverage preparation

In the Arab world, one of the ancient applications of dates is in the formulation and preparation of beverages (Raliman et al., 2017). Roasted dates are used to brew hot drinks similar to coffee, they may function as either a foll or a partial replacement for coffee itself. In some instances, milk, spices, or herbs are also added to drinks formulated with dates. Abdillah and Andriani (2016) produced a healthy drink consisting of date combined with ginger (a functional ingredient): this represents a healthy and cheap alternative to regular coffee. The best ratio for the inclusion of dates in regular coffee has been found to be 9% (Venkatachalam and Sengottian, 2016). A range of roasting times and temperatures for dates powder have been

explored, with the optimum roasting conditions, considering its physicochemical and organoleptic characteristics found to be 199.9-C for 21.5 min (Fikry et al., 2019).

Rahman et al. (2017) studied the composition and thermal transition characteristics of roasted dates powder, their results elucidated the nature and characteristics of this biomaterial. In another study, dates powder was mixed with baricy. cardamom, button roses, nutmeg, and cloves at three different concentrations (specifically, 100, 92.5, and 61.67% concentration of dates). The nutritional value of each of the three blends was higher than that of regular coffee, with low caffeine content. The blend with 61.67% dates concentration was found to provide the best overall sensory acceptability compared to a control (with scores of 8.7 and 8.5, respectively), and it was also higher in antioxidant activity than control coffee (with activity occurring at 91.7 and 84.2%, respectively; Ragab and Yossef, 2020). Similarly, six cappuccino and latte formulations were prepared, with Nescafe product substituted with dates powder at concentration levels of 10, 20, 30, 40, 50 and 60%. The caffeine-free cappuccino formulation with 50% substitution was rich in minerals, dietary fibers, antioxidants, and this was found to be the most acceptable ratio in a sensory analysis (Al-Gami, 2020). El Sheikh et al (2014) substituted cocoa with 9% dates powder to produce a cocoa drink; sensory evaluaticet of taste showed that this was considered to be superior to the original cocoa drink. Other studies have focused to a greater extent on the pharmaceutical impact of dates. Mirghani (2017) the chemical composition of a dates drink prepared at a ratio of 1:15 (wav). Their results showed that the prepared drink contained protein (2%), copper (0.9mg / g) calcium (2% * mg / g) iron manganese (0.4mg / s) magnesium (3) potassium (6.7mg / g) glucose (0.74g / L) and fructose , researchers explored the effects of the a atherogenic properties of a dates beverage in 32 menopausal women. The participants consumed a dosage of 2.5 g of nes per day for 14 days in the form of a drink, and lipid profiles were

conducted before and after this treatment, The revealed that routine consumption of dates beverages could enable maintenance of a healthy lipid profile (Saryons and Proverawati, 2018). (0.6g / L) (0.9mg / g)

2.3.2 Date in the Production of Bread

Good loaf volume and rich fiber content were observed by Al- Amri et al. (2014a) with the addition of milled danes to bread dough at a concentration of 4 to 12%. Taking a different approach, Hejri-Zarifi et al. (2016) germinated dates at 30 C for 2 weeks, before detaching the germs from the seeds, with the dates themselves being considered a residue of this process. The addition of dates germs and powdered residue to dough at a ratio of 0.5-3% was associated with a reductions in bread spoilage when the bread was stored for 5 days.

The inclusion of raw milled dates in bread at a 15% ratio has been claimed to reduce the risk of diabetes va a beneficial hypoglycemic effect (Halaby et al., 2014), while enrichment of Arabic bread with 5-20% dates powder has be shown to provide a boost in flavonoids and antioxidant capacity (Platat et al., 2017).

Similar effects have been observed for pita bread fortified with date pit powder at a ratio of 5-20%, Regular bend and whole wheat bread were analyzed as controls in this study, these were found to have fiber content of 1 and 16.2% respectively. In comparison to the bread enriched with dates, regular bread was lower in fiber in all cases, however, whole wheat bread was found to have a lower fiber content than only dates bread enriched at concentrations above 10% (c 15 20%, with 8.1 and 8.9% fiber content, respectively). Total flavones and total phenolic compounds were found to be higher so whole wheat pita bread compared to regular bread, and higher levels were observed in bread enriched with dates than in bit controls, in a dosage-

dependent manner (specifically, there was an increase from 10 to 26.9 and from 16 to 6732 respectively; (Platat et al., 2019)

2.3.2 Dates in The Production of Snacks and Biscuits

Dates powder has been used as a fortification agent in biscuits and snacks, either alone or as a blend with other ingredients, to achieve a desired functionality. Najjar et al. (2022) produced cookies using dates powder as a fur replacement at levels of 2.5, 5.0, and 7.5%. Two types of flour were used (white and whole wheat), and niong temperatures were tested (10 min at 180-C and 8 min at 200-C). Thus, their study included cookies produced with a total 12 different combinations of the aforementioned factors, with each combination tested for dates from several date sa The moisture content of the formulas was primarily affected by baking temperature and flour type. The cookies primarily affected by the ratio at which dates powder was added (specifically, addition at a higher ratio produced a color), which had a negative effect on consumer acceptance in most cases. Overall acceptability of the cookies was found a be higher for the whole wheat flour versions in the case of all dates varieties. Overall, for all combinations and dates varieties, consumer acceptance was affected by the ratio at which dates were added and the type of flour used. The formulas containing dates of the Khalas and Zahidi date varieties at a level of 7.5% were considered the best, according to senior analysis.

In another study, conducted by Abushal et al. (2021), the addition of dates powder to cookies (at a 5-15% ratio) way found to enhance their nutritional value, primarily by increasing their fiber content to a level covering 15% of the daily required value. Additionally, it was found to extend their shelf life (due to the significant reduction in moisture content) and to improve consumer acceptance in terms of color, taste, odor, flavor, texture, and overall acceptability based on a seven point hedonic scale, Similarly, the use of dates as a natural fat replacer in

cookies at various concentrations (10, 20, 30, and 40%) was associated with increased total phenolic content (from 18.56 to 451.60 mg GAE/100 g of sample) and total flavonoids (from 27.43 to 361.20 mg CE/100 g of sample) in a dose-dependent manner. In addition, the crude fiber and protein content of the cookies fortified with dates increased from 0.44 to 8.70% and 11.79 to 12.69%, respectively, in a dose dependent manner. The sensory and textural acceptability of the cookies, including their taste, color, appearance, texture, and overall acceptability, were observed to be significantly higher when fat was replaced by dates powder at 20% or below. compared to the use of commercial wheat flour (used in a control product). In contrast, the addition of dates powder at note than 20% was found to produce an unpleasant mouth feel and hard texture compared to the control (Saced et al., 2021)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the researcher will present the materials and the methods adopted in experimenting the research topic. cher will be presenting the utilization of date in the production of snack and bread. The date seed which was the ingredient being used was purchased at was purchased at fango (Kulende Market), Horin,

3.2 Research Design

A Field survey method approach of research design was adopted in this study. A field survey research assess situation prerequisite to inference and generalization. A field survey method enables the researcher to successfully access field hon with repands to the use of date in the production of bread and snacksin hospitality industry and its benefit to Successful field operation must be based on soundly structured questionnaire, and well trained interviewers. A field method enables the researcher to obtain the opinion of the representative sample of the targeted population in order to the perception of the entire population on how date can be used for bread.

3.3 Study Area

Tine Study area of the study is some selected sensory evaluators which consist of hoteliers, front Office staff etc.

3.4 Target Population of the Study

Population as the means of identifying characteristic which number of the universe have in common and which will my cachand reog a member of a particular group. The population for the study will be Thirty (30)

3.5 Sampling Techniques

The techniques for research this study, shall be carryout in specific area of sample study to cover the particular area population on the basis of questionnaire administered for respondent view.

(AKOYAMINI (2022) formula is used to determine the sample size for research TARO (2022) method. N(1/N(c)?

Where n sample Size (17)

population

1st (0.05 on the basis of 95% confident level

3.6 Sampling Size

The sample size is a reasonable number of selected trait, event or members taken from population as a representative of population, so the sample for the study will be Thirty (10) selected personnel A Simple random sampling was used to direct population elements

Research Instrument

The instrument for this research work is the use of questionnaire: Which consist of section A and Section B. the A deals with the Hio data of respondents while the section 1 deals with the Research Based question on the research

3.7 Data Collection Techniques

Data collection techniques for this research project includes primary and secondary sources of data collection some of data are sources of data collected through oral interview, questionnaire administration and some form of communication between the researcher and the respondents in the organization. The researcher urged the respondents to respond honestly to the question administered.

Secondary sources of data are the information that have already been recorded in the subject data in various document including books, journals and annual reports of the organization.

3.8 Data Analysis

The researcher used the percentage method as statistical techniques to analysis and interpreted the data collected.

The statistical tool that suits this project is space man's rank correlation and is used to determine the relationship between two qualitative data

INGREDIENT NEEDED FOR THE RESEARCH WORK

3 cups dates, pitted and chopped

cups haling water

Baking soda

espin dargarine

seasporan salt

сарай рароне Bout

quella stract

PRODUCTION METHOD DIRECTIONS

Combine baking soda solution for 30 minutes

Soak the dates in the water and baking soda solution for 30 minutes

Cream sugar and butter together

Add eggs, vanilla dates and soaking liquid, nuts flour and salt.

Divide batter equally between two 9x5-inch (or three 81/2 x 41/2 –inch) greased loaf pans.

Bake 1 hour at 300 degrees F (150 degree C) or until loaf tests done).

IS BREAD MADE FROM DATE

To make bread from dates, the process typically involves using dates as a sweetener or flavor enhancer in the dough.

rasupats and provide moisture, making them a healthier alternative to refined sugars. Here's a detailed waif how becad can be made using datec

Datespitled and purced to act as a natural sweetener. You can also chep the dates if you want chonks in

All purpose Dil whole wheat flour, or a combination of both can be used

Yeast Active dry yeast for leavening and giving the bread its rise.

Warm Water or Milk Used to activate the yeast and hydrate the dough

Salt Adds flavor and balances the sweetness from dates.

Olive Oil or Butter Adds moisture and flavor

Optional Additions Nuts (bike walnuts), spices (like cinnamon), or seeds can be added to enhance flavor and

Poep by-Step Procedure:

Prepare the Date Paste:

Soak the Dates: Start by soaking the dates in warm water for about 15 20 minutes to soften them. If you prefer, you can also soak them in warm milk or any dairy alternative. This step is essential to ensure the dates can be blended easily into a smooth paste.

Puree the Dates: After cooking, drain the dates (reserve the water for later use) and blend them into a smooth paste las date paste will be used as the primary sweetener in your bread dough. You can adjust the thickness of the paste with a little bit of the reserved water if needed.

elivate the Yeast

Dosobe a peket of active dry yeast in warm water (around 1101/13°C). Add a small punch of sugar to the water to help activate the yeast

Let it sit for about 5 10 minutes, until it becomes frothy is the Dough:

iss large mixing bowl, combine flour, salt, and any additional spices (like cinnamon or motracg).

If you want a rifier, denser bread, you can replace part of the white flour with whole wheat flour

All the date paste to the dry ingredients, mixing well Pour in the activated yeast misture, followed by the olive oil or butter. Slowly incorporate the ingredients, adding warm water for the water used for soaking the dates) as needed until the dough starts to come together

Mis until the dough is soft but not too sticky. Adjust the consistency by adding more flour of seeded

Locad the Dough:

Lure the dough out onto a floured surface and knead a for about 8 10 minutes. The dough should bewene smooth id clastic during this process

it you're using any additional ingredients like chopped mats or seeds, fold them into the dough while kneading

Hise

Pace the dough is a greased bowl, cover it with a damp cloth or plastic wrap, and let it rive in a warm place for about hours, or until it doubles in size

hape the Dough:

lace the dough has risen, punch it down to release the air. Turn it out onto a floured surface and shape it into a louf divide it into smaller portions if making rolls.

You can shupe the dough into different forms, such as a traditional loaf, braided bread, er rotic rounds

Kiver

Gramfer the shaped dough into a greased loaf pan or haking sheet. Cover and allow it to the again for 30 45 minuter it has puffed up

Be the Bread:

Prohem youur oven to 350°F (175°C

Once the dough has risen for the second time, place it in the oven and bake for 25-35 minutes (for a standard loaf),

th the bread is golden brown and sounds hollow when tapped on the bottom,

Winoking smaller rolfs, adjust the boking time to around 15-20 minutes. and Serve

Remove the bread from the oven and let it cool on a wire rack. Allow the bread to cool completely before slicing

Nutritional Benefits of Using Dates in Bread:

Natural Sweetener Dates are an excellent source of natural sugars, which can reduce or eliminate the need for med sagar in bread recipes,

#ther-Mich. Dates are high in dietary fiber, aiding digestion and promoting gut health

Rick in Vitamins and Minerals Dates contain essential nutrients such as polassam, magnesium, cepper, and

Moisture The date paste adds moisture to the bread, making it soft and tender.

HOW SNACKS IS MADE FROME DATE

Mak Maksimom dates can be done in various ways, depending on the type of stuck you want to create. Dates are worlicky of natrients, making thera an methods of preporing snacks with dates excellent base for both bealthy and itidieleent snacks. Here are

Hate Energy Halls or Hites

are one of the simplest and most popular date-based snacks, made by blending dates with nuts, seeds, and other ul ingredients

redients:

Dates (pitted) Soft Medjool dates work best.

Nats Almonds, cashews, walnuts, or any preferred nut.

Seeds Chia seeds, flaxseeds, or pumpkin seeds.

Nut Butter (optional) Peanut botter, almond butter, or cashew butter.

Cocoa powder or shredded coconut For flavor and coating

Optional Add-ins: Vanilla extract, cinnamon, dried fruits, chocolate chips, or protein powder.

Prepare the Dates: If your dates are not soft, soak them in warm water for 10 15 minutes and drain.

Mend the Ingredients in a food processor, blend the dates until they form a sticky paste. Add in the nuts, seeds, and any additional ingredients like nut butter or protein powder. Blend until everything is well combined and forms a dough like texture

Form the Balls: Scoop ont portions of the mixture and roll them into small balts (about 1 inch in diameter). You can

reif them in shredded coconut, cocoa powder, or crushed nuts for extra texture and flavor

Chilland Store. Place the energy balls in the refrigerator to firm up for about 30 minutes. Store them in an airtight tasar mothe fridge for up to two weeks

Tule Bars (No Hake or Haked)

pors arcanother casy and nutritious snack, often made with oats, nuts, and dates. They can be baked or prepared as a no option

dients:

Dates Pilted and soaked if needed.

Oats Rolled cats or quick oats.

Nuts and Seeds Almonds, walnuts, sunflower seeds, etc

Nut Butter For binding the ingredients together.

Optional Add-ins. Chocolate chips, shredded coconut, dried fruits, vanilla extract, cinnamon, etc.

ractions (No Bake Version):

P'espare the Date Paste: Blend dates in a food processor until a smooth paste forms.

Mix the Ingredients: In a large bowl, combine the date paste, oats, and any add-ins like nats, seeds, or chocolate chips. Add nut butter to help bind everything together.

Press into a Pan: Press the misture into a parchment-lined boking dish, esaking sure it's packod tightly Chill Refrigerate the bars for at least an hour to firm up. Once firm, cut them into bars or squares

Store Move the date bars in an airtight container in the fridge for up to two weeks.

ructions (Baked Version):

Preheat Oven: Preheat the oven to 350°F (175°C).

Prepare the Misture: Blend the dates, oats, and nuts, then press the mixture into a greased or lined baking pan.

Bake: Bake for 15 20 minutes until the bars are golden and firm.

Cool and Cut Let the bars cool completely before cutting them into squares.

affed Dates

Sites are a quick stack where dates are filled with different ingredients, offering both sweet and savory options,

gradients:

Usies Pitted

Filling Options

Nut butters (peanut butter, almond butter, etc.)

Cream cheese or goat cheese

Nuts (walnuts, almonds, pecans).

Chocolate chips or dark chocolate.

Cut flakes, granola, or seeds.

Prepare the Dates. Cut the dates open lengthwise and remove the pit if they aren't already pitted.

Add the Filling till cach date with your choice of filling, such as a spoonful of nut butter, cream cheese, or a picce of chocolate. You can also add a nut inside for crunch

Optional Garaish: Sprinkle with shredded coconut, sea salt, or drizzle with honcy or melted chocolate

Chill or Serve: You can serve them immediately, or chill them in the refrigerator for 15 20 minutes to firm up.

Dave Smoothies

can be used so naturally sweeten smoothies, making them a great base for energy-boosting drinks,

dients:

Dates Fitted

Bananas Proven for creaminess

Nut Butter Almond, peanut, or cashew,

Milk or Dairy Aiternative Almond milk, coconut milk, etc.

Optional Add ins Spinach, chia seeds, cocoa powder, protein powder, etc

actions:

Hicad the Dates: Start by blending the dates with a little milk to break them down.

Add Remaining Ingredients: Add the banana, nut butter, and any other desired ingredients, Hiend until smooth and creamy

Serve Pour intis a glass and enjoy!

e Granola or Granula Bars

abso be soed in granola mixtures to hind and sweeten the oats and nuts.

edients:

Dates Pined and blended into a paste

Outs Rolled pats

Nuts and Seeds Almonds, walnuts, sunflower seeds, pumpkin seeds.

Sacetener Honey, maple syrup (optional if using dates as the primary sweetener)

Optional Add-ins. Died fruits, chocolate chips, coconut flakes, cinnamon, etc.

Pexpore the Date Paste: lend the dates into a smooth paste.

Mis the Ingredients. In a large bowl, combine the cuts, nuts, and seeds. Add the date paste and mis until everything is couled

Bake or No Bake

For haked granola, spread the mixture on a baking sheet and bake at 300°1 (1500°C) for about 20 25

es, stirring halfway through.

no hake granola bars, press the mixture into a lined pan and refrigerate until Grow, than sut into bars

Menal Benefits of Date Snacks:

Natural Sacciener Dates provide a healthy alternative to refined sugar

lich in Fiber: Great for digestion and gut health

Nourte of Entrys thigh in natural sugars and carbs for a quick energy boost

Packed with Nutricats: Dates are rich in vitamins (such as 116) and minerals (like potassium, magnesium, and non).

modalogy for Sensory Evaluations

Sluts for the Breadfruit tlour for the production of snacks in the hospitality Industry are done using we testing through the design of a structured questionnaire to carefully selected panels of personal recruited for ilusssting afhor the usine of the Date:

consist of the folfowing structured sensory evaluation firm as shown below

yang for cach of the following, appearance, Laste flavor, texture fconsistency, arnoma sesel and overall

Rating Scale

Appearance

Texture/ Consistency

Aroma Smell

Taste

Overall Acceptability

ahilite

Very Lond

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 INTRODUCTION

The research Sensory Evaluation questionnaire were distributed to some randomly selected staff and students of the hospitality department in Kwara State Polytechnic, Ilorin. A total of Thirty (30) questionnaires were fully answered and returned back to the respondents after affective testing of bread and snacks using data analysis.

4.2 DATA ANALYSIS AND RESULTS

The following data were presented and analyzed. Data presentation were made under two sub-headings Section A and Section B. Section A consist of demographic characteristics of respondents while Section B consist of main Sensory evaluation data analysis.

SECTION A: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The following demographic data are analyzed in this research project based on the responses received from the administered questionnaire:

TABLE 4.1: SEX OF RESPONDENTS

SEX	FREQUENCY	PERCENTAGE%
Female	24	70%
Male	06	30%
Total	30	100%

The table 1 above shows that 24 respondents representing 70% of the respondents are Female while the remaining 6 respondents representing 30% are Male.

Source: Field Survey, 2024

TABLE 4.2: AGE OF RESPONDENTS

SEX	FREQUENCY	PERCENTAGE%
Under 25 years	16	30%
26-39	11	55%
39-59	03	15%
60 above	0	0%
Total	30	100

Source: Field Survey, 2024

The table 2 above shows that 16 respondents representing 30% are under 25 years. 11 respondents representing 55% are 26-38 years, 3 respondents representing 15% are 40-59 years while no respondent is 60 years and above.

TABLE 4.3: EDUCATION QUALIFICATION

SEX	FREQUENCY	PERCENTAGE%
O'Level	02	10%
OND/NCE	22	60%
HND/BSC	04	20%
MSC	02	10%
PHD	-	-
Others	-	-
TOTAL	30	100%

Source: Field Survey, 2024

The table 3 shows that O' level are 2 respondents i.e. 10%, OND/NCE are 12 respondents ie 60%, HND/BSC are 4 respondents i.e. 20% while MSC are 22 respondents i.e. 10%. No holder of PHD or Others qualifications."

TABLE 4.4: MARITAL STATUS

SEX	FREQUENCY	PERCENTAGE%
Single	26	80%
Married	04	20%
Total	30	100%

Source: Field Survey, 2024

The table 4 shows that respondents that are single are 26 respondent's i.e. 80% and those that are married are 4 respondents i.e. 20%.

SECTION B: SENSORY EVALUATION DATA ANALYSIS

The following statistical results are obtained from the analysis of the Sensory evaluation data analysis questions as structured in the administered questionnaire:

TABLE 4.5: APPEARANCE OF BREAD AND SNACKS USING DATE FRUIT

SEX	FREQUENCY	PERCENTAGE%
Excellent	-	-
Very Good	26	80%
Good	04	20%
Fair	-	-
Poor	-	-
TOTAL	30	100%

Source: Field Survey, 2024

The table 5 above simply shows that No respondent rated the appearance of experimental Bread and snacks using date fruit excellent. However, 26 respondents representing 80% of the total sensory evaluators rated the recipe Very Good while 4 respondents representing 20% of the total sensory evaluators rated the recipe Good Ne respondent rated the appearance of experimental bread and snacks fair or poor.

TABLE 4.6: TASTE/FLAVOUR OF BREAD AND SNACKS USING DATE FRUIT

SEX	FREQUENCY	PERCENTAGE%
Excellent	12	40%
Very Good	10	33.33%
Good	06	20%
Fair	02	6.67%
Poor	-	-
TOTAL	30	100%

Source: Field Survey, 2024

The table 6 above shows that 12 respondents representing 40% of the total sensory evaluators rated the Taste/Flavour of experimental Bread and snacks using date fruit excellent. However, 10 respondents representing 33.33% of the total sensory evaluators rated the snacks and bread Very Good while 6 respondents representing 20% of the total sensory evaluators rated the snacks and bread Good. Also, 2 respondents representing 6.67% of the total sensory evaluators rated the recipe fair while No respondent rated the Taste/Flavour of experimental recipe poor.

TABLE 4.7: CONSISTENCY OF BREAD AND SNACKS USING DATE FRUIT

SEX	FREQUENCY	PERCENTAGE%
Excellent	01	5%
Very Good	06	30%
Good	15	50%
Fair	08	15%
Poor	-	-
TOTAL	30	100%

Source: Field Survey, 2024

The table 7 above shows that 1 respondents representing 5% of the total sensory evaluators rated the Consistency of experimental Bread and snacks using date fruit excellent. However, 6 respondents representing 30% of the total sensory evaluators rated the recipe Very Good while

15 respondents representing 50% of the total sensory evaluators rated the recipe Good. Also, & respondents representing 15% of the total sensory evaluators rated the recipe fair while No respondent rated the Taste/Flavour of experimental recipe poor.

TABLE 4.8: SMELL/AROMA OF BREAD AND SNACKS USING DATE FRUIT

SEX	FREQUENCY	PERCENTAGE%
Excellent	01	5%
Very Good	11	30%
Good	10	50%
Fair	03	15%
Poor	-	-
TOTAL	30	100%

Source: Field Survey, 2024

The table 8 above shows that 1 respondents representing 5% of the total sensory evaluators rated the Smell/Aroma of the experimental Bread and snacks using date fruit excellent. However, 11 respondents representing 30% of the total sensory evaluators rated the bread and snacks Very Good while 10 respondents representing 50% of the total sensory evaluators rated the bread and snack very good. Also, 3 respondents representing 15% of the total sensory evaluators rated the recipe fair while no respondent rated the Smell/Aroma of the experimental recipe poor.

TABLE 4.9: ACCEPTABILITY OF BREAD AND SNACKS USING DATE FRUIT

SEX	FREQUENCY	PERCENTAGE%
Excellent	02	10%
Very Good	18	40%
Good	06	30%
Fair	04	20%
Poor	-	-
TOTAL	30	100%

Source: Field Survey, 2024

The table 9 above shows that 2 respondents representing 10% of the total sensory evaluators rated the acceptability of Bread and snacks using date fruit excellent. However, & respondents representing 40% of the total sensory evaluators rated the snack and bread Very Good while 6 respondents representing 30% of the total sensory evaluators rated the bread and snacks Good. Also, 4 respondents representing 20% of the total sensory evaluators rated the recipe fair while no respondent rated the recommendation of the experimental recipe poor.

TABLE 4.10: RECOMMENDATION OF Bread and snacks using date fruit

SEX	FREQUENCY	PERCENTAGE%
Excellent	07	10%
Very Good	15	50%
Good	06	30%
Fair	02	10%
Poor	-	-
TOTAL	30	100%

Source: Field Survey, 2024

The table 10 above shows that 7 respondents representing 10% of the total sensory evaluators rated the Recommendation of experimental Bread and snacks using date fruit excellent. However, 15 respondents representing 50% of the total sensory evaluators rated the recipe Very Good while 6 respondents representing 30% of the total sensory evaluators rated the recipe Good. Also, 2 respondents representing 10% of the total sensory evaluators rated the recipe fair while no respondent rated the recommendation of the experimental recipe poor

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This research work examines the utilization of date in the production of snacks. Data was collected using the sensory evaluation form. Thirty (30) respondents was used as the sensory evaluators. The objective of the study is to examine the health benefits of date in human health, to investigate other uses of date apart from sugar replacement. To produce bread and snacks using date as sweetener. The study was divided into five chap Chapter one deals with the introduction to the research topic. Chapter two examines the review of relevant literature on the topic. Chapter three consist of the research methodology. Chapter four consist of the presentation of data, while chapter five being the last chapter comprise of the summary, conclusion and recommendations to the Topic

5.2 Conclusion

Date palm cultivation is of high importance in the Middle East, Africa, South America, and recently Australia. In some regions, apart from being a staple food, the tree serves the people in many other aspects Harvesting date palm fruit generates a significant amount of waste, which is a burden to the environment. A present, fruit that does not meet the market value, as well as other inedible parts, are relatively well exploited in many industrial applications. The literature shows creativity in date waste valorization. Nevertheless, more opportunities to exploit date waste for a novel and high-market-value products are still available. Furthermore, Over more than four decades, significant progress has been made in the addition of date to various foods and bioproducts. The literature on applications of date in food has been comprehensively reviewed here. considering their uses across various food groups. In addition, threshold limits for the

addition of date have been compiled, considering the nutritional value and sensory characteristics of the fortified products. The utilization of dine in foods could help the date fruit industry to optimize the use of its waste products, and could also contribute to local food security and reduce negative environmental impact.

5.3 Recommendations

In the course of this research, the following research recommendations are being brought up: More studies and review must be done on the health benefits of date in human health. Other uses of date apart from sugar replacement should also be examined.

Furthermore, more date trees should be planted because of its numerous health benefits. Sensitization program should be done on how date can be used as replacement for sugar in the course of snacks and bread production.

REFERENCES

Ahmed, G. Ledley, V. Abdul, G (2019): Preparation of activated carbons from date (Phoenix dactylifera and application for wastewater treatments: Review, Proc. Saf. Environ. Prot. 102: 168-182.

Al-Harrasi, R. Ashraf, K and Hamidi-Esfahani, ID (2014): Mechanistic insights into the remediation of desalinated water using roasted date pits. Chem. Eng. J. 308: 463-475.

Bray, E (2019): Date and data processing: A review. Food Rev. Int. 27: 101-133.

Chao, L and Krueger, R (2017): Production of biodiesel from low priced, renewable and abundant date Finergy 86: 124-132.

Glasner, L. Glascow R, and Fred, H (1999): Polyol production by chemical modification of date seeds. 34:1035-1040.

Reoveni, E (2018): The effects of replacing Rhodes grass (Chloris gayana) hay with Ghaf (Prosopis the performance of Omani native sheep. Trop. Anim. Health Prod. 36: 281 294,

Siddiq, L. (2014): Chemical composition of date palm (Phoenix dactylifera L.) seedo from six Saudi Seed oil from Saudi Arabian cultivars. J. Food Sci. 83: 624-630.

Wrigley, Q (2019): Usage of Date (Phoenix dactylifera L.) Seeds in Human Health and Animal Feed. In Nuts and Seeds in Health and Disease Prevention; Preedy, V.R., Watson, R.R., Patel, V.B., Eds.; Elsevier: Amsterdam, The Netherlands, 2019, Chapter 53, pp. 447-452.

Zaid, K and de Wet, W (2019): Phenomenological modeling and intensification of texturing/grinding extraction; case of date seeds (Phoenix Dactylifera L.). Arab. J. Chem. 2019, 12,2398-2410.

JOURNALS

Abdelghafor, G. King, D. and Gerd, 11 (2019): Production of acetonebutanol- ethanol from spoilage date palm (Phoenix dactylifera L.) fruits by mixed culture of Clostridium acetobutylicum and Bacillus subtilis. Biomass Bioenergy. 42: 172-178

Abdillahm, II and Andriani, R (2016): Renewable materials to reduce building heat loss: Characterization of date palm wood. Energy Build. 43:491-497,

Abu- Thabit E., R, Ling, D. Kingsley, F and Fred, S (2020): Physico-chemical properties of (Phoenix dactylifera). I Food Eng. 76:348-352.

Alsashal, E. Bryan, E and Olad, T. (2021): Preparation of activated carbons from date (Phoenix dactylifera stones and application for wastewater treatments: Review. Proc. Saf. Environ. Prot. 102: 168-182.

Akasha, G. King, S and Helder, Y., (2016): Date palm tree (Phoenix dactylifera L.): Natural options. Front. Plant Sci. 8: 845.

Al. Amri, H. Al-Habsi, T. and Al-Rahman, F (2014): Chromatographic separation of fructose from date Sci. Nutr. 57: 83-96.

Al-Alawi, G. Al-Habsi T. and Al-Rahman F (2017): Compositional and functional characteristics of dates, syrups, and their by-products. Food Chem. 104: 943-947

Al-Garni, E (2020); Nutritional and functional properties of dates: A review. Crit. Rev. Food Sci, Nutr. 48:877-887

Algattan, J. Basuny, D and Al-Marzooq, L., (2021): Adsorption kineties and performance of packed bed adsorber for phenol removal using activated carbon from dates' stones. J. Hazardous Mater. 170:763-770.

Alydelli, R. Bray E, and Medlas Y (2020): Nutritional assessment and antioxidant analysis of 22 date palm (Phoenix dactylifera) varieties growing in Sultanate of Oman. Asian Pac. J. Trop. Med. 751: $591-5598.

Ashraf, H and Hamidi-Esfahani, D. (2017): Extraction of date palm seed oil (Phoenix Dactylifera) by Int. J. Adv. Eng. Technol. 8: 261-271 soxhlet apparatas

Ataye, H. Atlas, H and Ademola, Y. (2016): Natural fiber reinforced polymer composites in industrial applications: Feasibility of date palm fibers for sustainable automotive industry. J. Clean. Prod. 66:347-354.

Awad, J (2007): The fruit of the date palm: its possible use as the best food for the future? Int. J. Food Sci. Nutr. 54:247 259

Baliga, J. Joe, H and King G (2018): Study on the extraction of date palm seed oil using soxhlet apparatus. Int. J. Sci. Res 7: 1266

Barreveld, R (2019) Biodiesel production from oils extracted from date pits. Green Sustain, Chem. 7: 71004

Basany, K and Al-Marzooq, S (2017): The influence of date syrup on color, texture and sensory properties of Gaz. Bull. Environ. Pharmacol. Life Sci. 3: 159-163.

Bouaziz, F. Usman, L. and Abdulaziz, T. (2020); Fermentation of date palm juice by curdlan gum production from Rhizobium radiohacter ATCC 6466 (TM): Purification, theological and physic Technol. 44-1026-1034, chemical characterization. Lebensm. Wiss

Carpenter, Sand Elmer, W (2019): Increasing the rate of ripening of date palm fruit (Phoenix dactylifera L.) ev. Helali by preharvest and postharvest treatments. Postharvest Biol. Technol. 43: 121-127.

Doud, K, Chad T and Chan R (2019): A review of the chemistry and pharmacology of the date fruits (Phoenix) dactylifera L.). Food Res. Int. 44: 1812-1822.

De Moraes Crizel, R. Ederson G and Luis K(2017): Production of mayonnaise from date pit oil. Food 943 Nutr. Sci. 2: 938

Defloor. K. Deepad Y and Green D (2019): Optimisation of xanthan gum production by palm date (Phoenix

dactylifera L.) juice by-products using response surface methodology. Food Chem. 121: 627-633.

Dowson, II and Aten, Q (2016): Fermentation of date palm juice by curdlan gum production from Rhizobium

radiobacter ATCC 6466 (TM): Purification, theological and physico-chemical Technol. 44: 1026-1034, characterization. Lebensm. Wi

El Sheikh, L., El-Hadji, G and Biram, N. (2014): Green extraction procedures of lipids from Ind. Crops Prod. 108: 520-525 Tunisian date palm seeds

Lan. 14 2016): Date seeds: Chemical composition and characteristic profiles of the lipid fraction. Food Chem. 84: 571 584

FAO/WHO, (2016): Evaluation of the nutritional value of functional yogurt resulting from combination of date palm syrup and skim milk. Am. J. Food Technol. 5: 259.

Fikry, J. Sidiqlf and Usman, F(2019): Adding value to hard date (Phoenix dactylifera L.): Compositional, functional and sensory characteristics of date jam. Food Chem. 112: 406-411.

Gheisari, E, Heydari, Z. and Basiri, 1. (2020): Use of rejects of date palm factories to bakery yeast production. Int. J. Biosci 12-269-274.

Gekett, L., Lin Fand Helder 11(2018) Valorization of date palm (Phoenix dactylifera) fruit processing by-products and wastes using bioprocess technology review. Saudi J. Biol. Sci. 20: 105-120.

Habib, I. and Ibrahim, W (2019): Assessment of polyphenol composition, antioxidant and antimicrobial properties of various extracts of Date Palm Pollen (DPP) from two Tunisian cultivars. Arab. J. Chem. 12:3075-3086,

Halaby, O. Hilary E and James Y., (2014): The date palm (Phoenix dactylifera L.): Overview of biology, uses, and cultivation. HortScience, 42: 1077.

Hazzouri, W. Mazraoui, K and Heldr, Y (2018): Dairy dessert processing: Effect of sugar substitution by date syrup an powder on its quality characteristics. J. Food Proc. Preserv 44: e14414.

Hejri-Zarifi, L. Mazraoui, K and Heldr, Y. (2016); Comparative performance of goats and sheep fed on diets supplemented with different nitrogen sources. J. Appl. Anim. Res. 13: 179-184.

Howard, Y. James Y and Meera, 1. (2018): Date flesh: Chemical composition and characteristics of the Chem, 111 676-682

Ho. X, Xin G and Lin, G(2019): Compositional characteristics of date syrup extracted by different fermented dairy products. Ann. Agric. Sci. 57: 29-36.

Kalbounch, L. (2011). Screening of medium components by Plackest-Burman design for carotenoid date (Phoenix dactylifera) wastes. Ind. Crops Prod. 36: 313-320,

Komlaga, H, James, 11 and Green, L. (2018): Date, The Food and Agriculture Organization of the United Nations Available from: http://www.faostat.fao.org/faostat/en/data/QC. [Last accessed on 2020 Jun 10). pp 200-210

Licb. L., Lin, G and Gred, T., (2020): Some physicochemical properties of date syrup, concentrate, and comparison with sucrose solutions. J. Agric. Sci. Technol. 18: 657-668.

Lobo, E. Yahia, S. and Kader, L. (2013): The effect of date versus sugar on sensory, physicochemical, properties of ice cream. Iran. J. Vet. Res. 21:9

Mirghani, 11. (2017): Chapter IX Date Harvesting, Packing House Management and Marketing Aspects. In: FAO Plane Production and Protection Papers, 175-205. The Food and Agriculture Organization, United Nation

Miousa, O (2016) Preliminary analysis and potential uses of date pits in foods. Food Chem. 76: 135-137.

Najjar, 1, Najib, Fand Usman, E (2022): Whole genome re-sequencing of date palms yields insights into diversification of fruit tree crop. Nat. Commun. 6: 8824,

Nixon, L. and Carpenter, 5 (2017): Chemical and technological properties of improved snacks from oat and date seeds composite flour. Am. J. Food Technol. 12:201-208.

Nison, L. and Carpenter, S.(2019): Biogas production by anaerobic digestion of date palm pulp waste. Al Khwarizmi Eng, 1 6:14-20

Nison, L. (2019): Tunisian date (Phoenix dactylifera L.) byproducts: Characterization and potential textural and antioxidant properties of dairy desserts. Food Chem. 188: 8-15.

Nor, K, Noor, K and Abdil, R (2018) Cropping patterns as a tool for water resource management in palm cultivation in Jifilik, Jordan Valley, Int. J. Environ. Stud. 68: 447-460.

Oychole, G Mayowa, Y and Ademola, T. (2019): Optimization of sugar replacement with date syrup in prebiotic chocolate milk using response surface methodology. Korean J. Food Sci. Anim. Resour. 37:449-455.

Platat, R. Mayowa Y and Ademola 1(2017): Experimental evaluation of eco friendly flocculants prepared from date pe rachis. J. Enviren. Sci. 22: 1539-1543.

Platst, R. Mayowa, Y and Ademola 1 (2019): Polybydroxyalkanostes production via Bacillus PCS palm syrup. J. Med. Plant Res. 5: 3312-3320

Plessas, 11, Penny E, and Ken. 11 (2018): Popenoc, R (2019), Modern supercritical fluid technology for Annit. Rev. Food Sci. Technol. 5:215-218

Ragab, I and Yossef, W (2020): A study of biogas production from date palm fruit wastes. J. Cleaner 1195

Ralintan, H. Lin, D and Xin, K. (2017): Feasibility stody of a cosmetic cream added with apreens extract and of (Phoenix dactylifera L.) fruit seed using experimental design. J. Cosmet. Scl. 66 1-12.

Rahanan, R. (2007) Biology and postharvest physiology of date fruit. la M. Siddiq, S. M. Aleid and A. A. Kader (Postharvest Science, Processing Technology and Health Benefits, John Wiley and Sous, Hoboken, New Jersey гр. 57-30.

Sonfi. L. Ling, and Preston, Y (2018): The use of concentrate containing Meskit (Prosople juliffons) palm byproducts to replace commercial concentrate in diets of Omani sheep. Anim. Feed Sci. Techmod 1201

Saced. L, Yusof, L, and Lawal, 1. (2021): Quality characteristics and antioxidant properties of muffins fruit (Phoenis Dactylifera 1.1 fiber concentrates. J. Food Qual. 19: 237-244,

Saryono, 1 and Proverawati, Q (2018): Effects of testicular status and feeding diets containing date palin by-prodont sensory attributes of Omani lamb meat. Small Rumin. Res. 38. 57-61

Schutyser, J and Van Der Goot, W (2017): Use of waste date products in the fermentative formation of baker's yest hiomass by Saccharomyces cerevisiae. Bioresour Technol. 60, 67-71

Selostulyo, Y and Zhou, W (2017): Midribs of date palm as a raw material for wood-cement composite Arabia, World Appl. Sci. J. 15: 1651-1658.

Shittu, Y. Shile, Y and Shinde, G. (2018): Characteristics and chemical composition of date palm (Phoenix canaries) and seed oil. Ind. Crops Prod. 32 360-365.

Sofi, E. Sodiq, L. and Salman, F (2017): Production of functional pita bread using date seed powder. 1. 52-6375-6384,

Vandercook, G. Vin S, and Steven, J (2018): Immunostimulant activity of dry fruits and plant traditional medical system for mothers after child birth and invalids. J. Ethnopharmacol. 71 89-92

Venkatachalam, L and Sengottian, S (2016). Development of a new medium containing date syrup for produstics of bleomycin by Streptomyces mobaraensis ATCC 15003 using response surface methodology Afr. J. Biotechol 5450-5459

Wang, J. Kin Rand Lang, R (2022): The time independent theological properties of low fat sesame blends as a function of fat substitutes and temperature. Food Hydrocoll

21:198 202

Williams, T and Phillips, K. (2021) Date-palm fibers media filters as a potential technology for tertiary wastewater treatment. J. Hazardous Mater. 161 608-611

Platat, R Mayowa Y and Ademola T(2017): Experimental evaluation of eco-friendly flocculants prepared from date palm rachis, J. Environ. Sci. 22: 1539-1543.

Platat, R. Mayowa, Y and Ademola, T.(2019): Polyhydroxyalkanoates production via Bacillus PCS palm syrup. J. Med. Plant Res. 5: 3312-3320.

Plessas, IH, Penny E, and Ken. H (2018): Popenoc, R (2019). Modern supercritical fluid technology for Annu. Rev. Food Sci. Technol. 5: 215-238.

Ragab, I and Yossef, W (2020): A study of biogas production from date palm fruit wastes. J. Cleaner 1195.

Ralıman, 11. Lin, D and Xin, K (2017): Feasibility study of a cosmetic cream added with aqueous extract and oil from date (Phoenix dactylifera L.) fruit seed using experimental design. J. Cosmet. Sci. 66: 1-12.

Rahman, R (2007): Biology and postharvest physiology of date fruit. In: M. Siddiq, S. M. Aleid and A. A.Kader (Ed.), Dates: Postharvest Science, Processing Technology and Health Benefits, John Wiley and Sons, Hoboken, New Jersey, pp. 57-80.

Saafi, 1. Ling, Fand Preston, Y (2018): The use of concentrate containing Meskit (Prosopis juliflora) pods and danc palm byproducts to replace commercial concentrate in diets of Omani sheep. Anim. Feed Sci. Technol. 120 11.

Saeed, L., Yusuf, L. and Lawal, L. (2021): Quality characteristics and antioxidant properties of muffins fruit (Phoenix Dactylifera L.) fiber concentrates. J. Food Qual. 39: 237-244.

enriched with date

Saryono, L. and Proverawati, Q (2018): Effects of testicular status and feeding dicts containing date palm by-product on the sensory attributes of Omani lamb meat, Small Rumin. Res. 38: 57-61.

Schotyser, J and Van Der Goot, W (2017): Use of waste date products in the fermentative formation of baker's yeast biomass by Saccharomyces cerevisiae. Bioresour. Technol. 60: 67-71.

Sclomulyo, Y and Zhou, W (2017): Midribs of date palm as a raw material for wood-cement composite industry in Saudi Arabia. World Appl. Sci. J. 15: 1651-1658.

Shitta, Y. Shile, Y and Shinde, G. (2018): Characteristics and chemical composition of date palm (Phoenix canariensis) seeds and seed oil. Ind. Crops Prod. 32: 360-365

Sofi, E. Sodiq, L. and Salman, F (2017): Production of functional pita bread using date seed powder. J. Food Sci. Technol. 52:6375-6384.

Vandercook, G, Vin S, and Steven, J (2018): Immunostimulant activity of dry fruits and plant materials used in indian traditional medical system for mothers after child birth and invalids. J. Ethnopharmacol. 71: 89-92.

Venkatachalam, L and Sengottian, S (2016): Development of a new medium containing date syrup for production of bleomycin by Streptomyces mobaraensis ATCC 15003 using response surface methodology. Afr. J. Biotechool 9 5450-5459.

Wang, J. Kin R and Lang, R (2022): The time independent rheological properties of low fat sesame blends as a function of fat substitutes and temperature. Food Hydrocoll.

Williams, Tand Phillips, K. (2021): Date-palm fibers media filters as a potential technology for tertiary domestic wastewater treatment. J. Hazardous Mater. 161: 608-613.

Zazucta-Morales, R Martínez-Bustos, M. Jacobo-Valenzuela, S Ordorica-Falomir, T & Paredes-López, (2001)

Characterization of date palm lignocellulosic by-products and self-bonded composite materials obtained thereof Mater. Des. 50: 302-308.

Zohary, K and Hopf, S (2018): Technological properties of date paste obtained from date byproducts and its effect on the quality of a cooked meat product. Food Res. Int. 44: 2401-2407