Heath benefits of palm tree

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Abstract

Date palm (*Phoenix dactylifera*) holds a revered position in diverse cultures globally, no longer handiest as a staple meal but additionally for its numerous health blessings. This paper presents a comprehensive evaluation of the fitness advantages associated with date palm intake. Date fruits are rich resources of vital nutrients, inclusive of vitamins, minerals, and nutritional fiber, contributing to average well-being. Furthermore, they incorporate bioactive compounds which include phenolic acids, flavonoids, and carotenoids, which own antioxidant, anti-inflammatory, and antimicrobial residences. Studies have confirmed the ability of date palm components to cope with numerous health conditions, inclusive of cardiovascular sicknesses, diabetes, and digestive issues. Additionally, date palm-derived merchandise, inclusive of date syrup and date seed extracts, has proven promising health-selling results. Moreover, date palm cultivation plays a vital function in sustainable agriculture, contributing to soil conservation and biodiversity preservation. This evaluation highlights the multifaceted fitness benefits of date palm intake and underscores its importance in promoting human fitness and environmental sustainability.

Keywords: palm tree, health benefits, antioxidant and cardiovascular diseases

Introduction

The date palm is one of the oldest cultivated fruit timbers. The tree can withstand high temperatures and low water and the fruit may be stored dry presenting vitamins throughout the yr. The first vicinity of cultivation is thought to be close to cutting-edge day Iraq, however, wherein and if the date palm changed into domesticated remains a topic of discussion. Recent studies of chloroplast and genomic DNA discovered two primary subpopulations of cultivars centered in both the Eastern range of date palm cultivation consisting of the Arabian Peninsula, Iraq, and elements of South Asia, and the Western range, inclusive of North Africa. To better understand the origins of date palm cultivation over 2 hundred mitochondrial and chloroplast genomes have been sequenced and analyzed from a geographically various set of date arms. Here it is proven that, based on mitochondrial and chloroplast genome-wide genotyping information, the most unusual cultivated date fingers comprise 4 haplotypes that seem related to the geographical location of cultivar origin. These records suggest a minimum 3 and possibly 4 unique maternal contributions to the modern-day date palm population and doubles the authentic range. One new haplotype was determined mainly in Tunisia, Algeria, and Egypt, and the second one in Iraq, Iran, and Oman. The Authors suggest that the earliest date palm cultivation happened independently in at least three wonderful places [1].

Botanical description

Common Name: Karpaha tharu/ Nungu/ Tree of life/ Celestial tree/ Palmyra palm/ Panna-Maram/ Mak tan Kok

Scientific name: *Borassus flabellifer* L.

Family: Arecaceae

Chromosome No.: 2n= 36 Ploidy: X=8 or 9, n=18, Allotetraploid.

Origin: Africa

Geographical distribution

Mauritania, Senegal, Mali, Gambia, Guinea-Bissau, Guinea, Ivory Coast, Upper Volta, Nigeria, Gabon, Congo, Sudan, Tanzania, Madagascar, Saudi Arabia, Iraq, Iran, Pakistan, Bangladesh, Sri Lanka, Myanmar, Thailand, Kampuchea, Malaysia, Indonesia. Other species: *B. Althiopum* Mart, *B. Sundaica* Becc.

Cultivation practices

Soil and Climate Adaptation: Palmyra hands show off adaptability to a huge variety of soil types, which includes arid land wastelands. They thrive specifically well in sandy soil, red soil, black soil, and river alluvium. These arms are also desirable for semi-arid regions with an annual rainfall of less than 750 mm. They can grow at altitudes from sea stage up to 800 meters, with a cultivation length usually coinciding with the northeast monsoon from October to November

Seed collection and treatment

The technique of cultivating Palmyra timber begins with the gathering of ripe results from elite bushes. These fruits are cautiously accrued and stored in color for about 4 weeks. During this length, the seed nuts are separated from the result and go through a 24-hour soaking in a solution containing 0.1% carbendazim. This remedy serves to lessen tuber rot prevalence and beautify germination costs.

Planting process

Palmyra timber is usually spaced at 3 meters with the aid of 3 meters, resulting in a population density of 1110 plants per hectare (or 450 in step with acre). It's important to note that these bushes show off a dioecious nature, with an equal sex ratio of male to woman individuals at 1:1. For the actual

planting technique, pits measuring 30 cm x 30 cm x 60 cm are organized. These pits are first of all stuffed midway with an aggregate of 10 kg of farmyard manure and topsoil. The seed nut is then carefully located inside the pit, with its germ pore (slender conical give up) going through downward or sidewise at the intensity of 5 cm. To similarly ensure the fitness of the seed nut, 100 grams of Malathion 4% dust is frivolously sprinkled around it, and then the nut is covered with soil. This meticulous technique to seed nuts and sowing is essential for successful tree cultivation. Planting coincides with the monsoon season, and if rainfall is insufficient, pot watering is required without delay after planting and on change days for up to a month. Subsequently, watering may be completed as soon as a week throughout non-rainy durations for the primary 12 months. During tapping season, if rainfall is scarce, pitcher irrigation may be furnished two times a month to reinforce near and fruit yield.

Post-cultivation activities

Several post-cultivation activities are important for the health and productivity of Palmyra trees after planting. Water tanks can be used for gap filling, Basin development should be completed before the rainy season to facilitate rainwater harvesting and storage Pruning is recommended, with 30% of the leaves removed; by accident, usually 10%. Crossbreeding is an option, and crop varieties are suitable for cropping alongside Palmyra trees.

Growth and yield

Palmyra trees show off slow growth, with the primary frond appearing about 5 months after planting. Fan-fashioned tree leaves emerge within the second year. Flowering, in the main for paneer (sweet sap) extraction, commonly takes place when the tree reaches a top of 12-18 meters, around 13-15 years of age. The yield of paneer and fruit can range notably amongst a person's hands, ranging from a hundred to 2 hundred liters of padaneer obtained over 4 months from February to May.

Yield

Average yield expectations include 150 liters of padaneer tree-1 yr-1, in conjunction with 24 kg of jaggery tree-1 year-1. The jaggery recuperation fee liter-1 of padaneer generally levels from a hundred and eighty to 250 grams.

Uses

Leaves serve various functions, which include thatching, mat-making, basket-weaving, fan and hat crafting, umbrella production, and even writing fabric. The difficult, heavy, and durable black timber is exceptionally widespread in creation, particularly for water-uncovered structures like wharves, fences, and boats. Young flora is edible, either cooked as a vegetable or roasted and pounded to create a meal. Fruits, inclusive of the younger, jelly-like seeds, can be loved roasted or raw. Sugary sap, referred to as toddy, is extracted from young inflorescences (each male and lady) and can be fermented into arrack or concentrated into crude sugar, often called jaggery or palm sugar. The roots can be dried and converted into Odiyal, a difficult and chewable snack [2].

Germinated seeds produce fleshy sprouts under the surface, which may be boiled and eaten up as a fibrous, nutritious food. The ripe fibrous outer layer of the result turns edible after boiling or roasting. The tender, jelly-like kernel in the difficult fruit shell is a refreshing, mineral-wealthy delicacy. When the crown of the palm tree is removed, the segment that produces leaves can be used to create a suitable for eating cake. In historical times, dried palm leaves had been hired for manuscript writing. In Indonesia, the leaves have been traditionally used as paper, referred to as “lontar.” The thorny edges of leaf stems are used to assemble fences, and the stem’s skin can be peeled off to be used as rope and weaving material for cots, or even in making rice flour cake in some components of Tamil Nadu. In the Japanese areas of India, Palmyra leaves are used by craft hand enthusiasts, mainly in the course of the scorching summertime months in Assam and West Bengal. Medicinally, the Palmyra palm has a mess of packages, which include treating diverse illnesses such as biliousness, dysentery, gonorrhea, heartburn, and breathing troubles. Its elements are used as mouthwash, dentifrice, tonics, and treatments for coughs, ulcers, dermatitis, and inflammatory skin troubles [2].

It is likewise used as a laxative and liver tonic. Palmyra fruit, in diverse forms, may be used for skin health, lowering signs and symptoms of chickenpox, and soothing situations like prickly heat and boils. It allows preserved hydration and replenishes lost minerals for the duration of a hot climate, aids digestion, and serves as a laxative. Palm jaggery is a natural sweetener with a low glycemic index, providing sustained electricity, and is rich in vitamins B and C. Sandalwood powder blended with sugar palm fruit can be applied as a remedy for boils, prickly warmth, and redness of the face, specifically effective after solar publicity. A cotton material soaked in sugar palm fruit pulp can alleviate inflammatory skin problems [3].

Characteristics

Perhaps the most exclusive tree in Bible lands is the date palm, *Phoenix dactylifera* with its towering, unbranched trunk crowned with sizeable spreading leaves numerous meters lengthy. The date palm is local to the Middle East; however, its family is almost entirely tropical in distribution. As we've visible from many different examples such as olive, myrtle, and fig, many Bibles vegetation belong to families with a center of distribution somewhere else. In nature, it's far discovered in barren region oases as it will tolerate low rainfall and a fairly excessive diploma of soil salinity. One of the most important desert cases is Jericho, which is watered by using a totally large spring, the spring of Elisha [4].

In addition to its fruit, the date palm changed into as soon as valued for its leaves which had been used to make baskets, roofs, etc. The trunk was utilized in the building. The date palm is unisexual, this is, and there are male bushes and female trees. The female flora endures dates. Many kinds of date palm are acknowledged; some have yellow results and a few crimson results. Because the plant life is unisexual, the girl bushes are planted with an occasional male tree to ensure fertilization of

the flowers. The palm produces shoots from its base; those are removed to bolster the main stem even though they also can be used to establish new flora. By planting those shoots, the grower is aware of the sex of the plant as well as the range and is as a consequence able to plant a grove of uniform bushes. If the trees have been grown from seed approximately half could be male and half of lady. Masses of small white flowers are produced on massive branches in the spring. The dates are harvested in past due summer and early autumn. In present-day Hebrew and Arabic, the ancient biblical call of the fruit, Tamar, is preserved. Tamar is a feminine name used in the Bible and present-day times [4].

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The first reference to the date palm is while the youngsters of Israel entered the wilderness after leaving Egypt. Here, at Elim, they encountered palm timber simply as a traveler in lots of parts of the Sahara nowadays could discover oases marked by palm timber. Sweet music was prominent in the decoration of the church. The walls of the temple were decorated with palm trees. Nor is any horn mentioned in the Tabernacle, which may be instructive Consider this difference. Unlike the residence, this temple.an earthly place for God to dwell. It shouldn’t have happened He was imprisoned until peace came and the country was in turmoil and it was given to Solomon in righteousness. The palm tree Ezekiel has an even greater role in the temple. Here is the soundtrack Tree on pillars of buildings, doorway, & various doorknobs [4].

A seasonal tree is a perennial liana, a shrub, and. The trees. They are the only members of the Arecaceae family, Arecales is the only genus in the order. They thrive in warm climates. The best-known trees are coconut, date palm, and oil palm Rhythm of sound. There are about 2600 trees, most of them living in tropical, subtropical, tropical and subtropical regions [5].

Trees are one of the most popular and widely planted trees in Different families. They have played a vital role in humanity throughout time Most of the history. Many common products and foods come from the fingers. It is commonly used in gardens and field gardens with no heavy lines. In ancient times, doors symbolized victory, peace, and fertility. Today, palm trees are a popular tropical and holiday symbol [6].

Palm farming and uses

Food and drinking

Palm trees offer a variety of foods and products beyond just coconuts and dates. In different parts of the world, people consume palm oil, sago, heart of palm, and even palm wine. Palm oil, which is extracted from the fruit mesocarp, has a wide range of applications, from cosmetics to cooking. Red palm oil, a more nutritious version of crude palm oil, is obtained through a series of processes, including pre-treatment, deacidification, and deodorization via short-path distillation. This careful processing preserves its rich content of β-carotene and vitamin E [7].

Red palm oil contains a blend of saturated and unsaturated fatty acids. The primary saturated fats are palmitic, stearic, and myristic acids, while the unsaturated fats include oleic, linoleic, and linolenic acids. This composition is said to offer several health benefits, such as combating vitamin A deficiency, promoting heart health, and even exhibiting anti-cancer properties.

The oil palm tree is believed to have originated in the tropical rainforests of West Africa, particularly in a coastal belt stretching between Liberia and Benin. The Yoruba people, native to this region, refer to the oil palm as the 'tree of life.' They have incorporated the palm into their culture, with numerous proverbs and riddles reflecting its significance. For instance, one Yoruba proverb goes: "A piece of meat has an outer layer of flesh, an intermediate layer of bone, and an inner layer of flesh." This riddle describes a palm fruit, which has an outer edible mesocarp, a hard shell, and an inner edible kernel [8, 9].

Date palm juice has a high tendency to spoil, limiting its use. Researchers developed a method to preserve concentrated juice and create ready-to-serve (RTS) drinks. The juice is heated to 85 °C for 5 minutes, scum is removed, and it's stored in sterilized glass bottles. It is then concentrated to different levels of total soluble solids (TSS), with 18% showing the best results for taste, sweetness, and microbial stability when treated with

potassium metabisulfite (KMS) and stored at 4 °C [10].

RTS drinks can also be made from heat-treated date palm juice at 9% TSS. By adjusting the juice concentration, drinks with varying percentages of date palm juice can be produced. An RTS drink with 30% date palm juice was found to have the best color, taste, and stability, with no significant changes in TSS, acidity, or microbial load over three to six months.

Medicinal uses

Cardiovascular

Cardiovascular disease (CVD) is one of the leading causes of death worldwide, representing a significant public health and economic burden. To address this, research is needed to identify cardio-protective foods and their bioactive components. Date fruit, rich in polyphenols, especially flavonoids, certain micronutrients, and dietary fiber, has the potential to positively affect vascular health and reduce the risk of vascular disease. In vitro and animal studies suggest that consuming date fruit or its extracts can influence key markers of vascular health, such as plasma lipid levels, triglycerides, cholesterol, oxidative stress indices, and inflammation. However, human data are limited. Further research is needed to better understand date polyphenols and their specific bioactive compounds, establish safe and effective levels of consumption, and uncover the mechanisms behind their effects. Clinical trials with rigorous design and evaluation of vascular disease markers like flow-mediated dilation, peripheral arterial tonometry, and gut microbiome profiles could offer valuable insights into the benefits of dates for human health. Emerging evidence suggests that including date fruit or its extracts in a healthy diet could be beneficial for those seeking to improve their vascular health [11].

In affluent countries, a significant public health concern is the overconsumption of dietary fats, which is closely linked to coronary heart disease. Tropical oils, particularly palm oil, have been unfairly demonized in the United States, even though palm oil consumption there is minimal. This negative perception appears to be driven by trade politics, as palm oil has become increasingly competitive, gaining a significant share of the global edible oils and fats market. What many people may not realize is that palm oil, like other edible oils and fats, is an essential part of the diet. The claim that palm oil consumption raises cholesterol levels and is therefore atherogenic is not supported by scientific evidence.

A closer look at the chemical and fatty acid composition of palm oil reveals that it has little potential to raise cholesterol levels. Palm oil is cholesterol-free and contains palmitic acid, its main saturated fatty acid, which has been shown to have a neutral effect on cholesterol levels, particularly when LDL receptors have not been down-regulated by diet or genetics. Palm oil contains minimal amounts of hypercholesterolemic saturated fatty acids, such as lauric acid and myristic acid. It also has moderate amounts of monounsaturated oleic acid and adequate levels of linoleic acid, both of which are known to lower cholesterol levels. Additionally, palm oil contains minor components like vitamin E tocotrienols, which are potent antioxidants and natural inhibitors of cholesterol synthesis. Feeding experiments in various animal species and humans do not support the idea that palm oil is atherogenic. Palm oil consumption may lower blood cholesterol compared to other traditional sources of saturated fat, such as coconut oil, dairy, and animal fats. Palm oil may also increase HDL levels and reduce platelet aggregation.

As with all dietary recommendations, achieving a balance of different fatty acids is essential. There is no single ideal source of fats that aligns with the American Heart Association's recommended ratio of 1:1:1 for saturated, monounsaturated, and polyunsaturated fats, with dietary fat intake at or below 30% of total calories [11, 12].

Glycemic index/Diabetes mellitus

Researchers analyzed the nutritional quality and glycemic index (GI) of three solar-dried date varieties—Khalas, Khsab, and Fardh—grown in Oman. They found significant ($p < 0.05$) variations in the proximate chemical composition, dietary fiber content, sugar fractions, and energy values among these dates. The moisture content ranged from 23.77 to 23.71 g/100 g of date flesh, ash from 1.12 to 1.55 g/100 g, crude protein from 1.28 to 1.89 g/100 g, total fat from 1.14 to 2.37 g/100 g, and nitrogen-free extract from 68.53 to 75.37 g/100 g. Dietary fiber and total sugar content ranged from 8.83 to 13.11 g/100 g and 52.17 to 59.96 g/100 g, respectively [12, 13].

The glycemic index of these date varieties collected from different regions in Oman ranged between 47.6 and 57.7, with no significant ($p>0.05$) differences in GI values among the different types. Regional differences in GI were also not significant ($p>0.05$). Notably, an inverse correlation (r^2) was observed between the fructose content and the GI of these dates, indicating that higher fructose content could be linked to a lower glycemic index.

Another study aimed to evaluate the glycemic indexes of three commercially available types of dates: Khalas, Barhi, and Bo ma'an. Dates are a common food item consumed worldwide, especially in Arabic regions, where type-2 diabetes mellitus is prevalent. Consuming low glycemic index diets has been associated with improved glycemic and lipid control, making it important to assess the GI of different date varieties. The available carbohydrate content of these dates was determined through standard laboratory methods, and glycemic indexes were calculated using standard techniques.

This study, conducted at the Faculty of Medicine and Health Sciences, United Arab Emirates University, in Al Ain, UAE, between March 2000 and August 2001, found that the mean glycemic index for Khalas was 35.5, for Barhi was 49.7, and for Bo ma'an was 30.5. The results showed a significant difference between Bo ma'an and the other two varieties. These findings suggest that dates can be classified as low glycemic index food items, although there may be notable differences in GI among some types of dates [13].

Despite the variations in glycemic index, the study indicated that the consumption of these three types of dates might offer benefits for glycemic and lipid control in diabetic patients. The significant variability in glycemic index between date types underscores the need for further research to understand the

factors contributing to these differences [14].

Maternal diet

Noted that despite diet a supplementation packages, nutrition a deficiency in youngsters remains a public fitness challenge in Honduras. The goal become to investigate the effectiveness of brief-term nutritional supplementation of mothers with crimson palm oil as a strategy for improving the diet a repute of the mother-little one dyad. Lactating moms in Colonia Los Pinos, a barrio of Tegucigalpa, Honduras, consumed a total of ninety-mg beta-carotene as crimson palm oil (n=32) dietary supplements (n=36) or placebo (n=18) in six equal doses over 10 days. Carotenoids and retinol in maternal and little one serum, and breast milk carotenoids and retinol have been measured earlier than and after supplementation. Maternal weight loss program turned into evaluated by means of 24-hour do not forget. Maternal serum alpha-carotene and beta-carotene concentrations have been expanded 2-fold by means of palm oil in comparison with 1.2-fold via beta-carotene dietary supplements. Changes have been significantly specific in toddler serum alpha-carotene however not beta-carotene a few of the 3 experimental businesses [15].

Increases in breast milk beta-carotene had been more for the palm oil group (2.5-fold) than for the beta-carotene supplement organization (1.6-fold) and will increase in milk alpha-carotene concentrations (three.2-fold) have been barely extra than the ones of beta-carotene. There had been also small but full-size changes amongst agencies in breast milk lutein and lycopene. Breast milk retinol become not notably distinct most of the businesses over the treatment duration. The facts reveal that purple palm oil within the maternal weight loss program increases provitamin a carotenoids in breast milk and serum of the mom-infant dyad. The use of nutritional red palm oil to improve the diet a repute of this population must be similarly investigated [15].

Neuroprotection

Mentioned that neurodegenerative sicknesses (ND) can be characterized through degradation and next lack of neurons. ND has been recognized because the leading cause of disability adjusted lifestyles years (DALYs) global and is associated with numerous danger factors consisting of aging, sure genetic polymorphisms, inflammation, immune and metabolic situations that may set off increased reactive oxygen species (ROS) release and next oxidative strain. Presently, no specific therapy or prevention is to be had for ND patients; the signs can be most effective alleviated via drug remedy or surgical treatment. The existing pharmacological remedies are handiest to be had for partial remedy of the signs [16].

An herbal product referred to as oil palm phenolics (OPP), which is high in antioxidant, should emerge as a capability supplementary antioxidant for neurodegenerative health. OPP is a water-soluble extract from palm fruit that tested medicinal homes such as anti-tumor, anti-diabetic, and neuroprotective effects. In this evaluate, OPP changed into proposed for its neuroprotective results via numerous mechanisms along with antioxidant and anti-inflammatory residences. Besides, OPP has been determined to modulate the genes worried in neurotropic activity. The evidence and proposed mechanism of OPP on the neuroprotective fitness may additionally offer a comprehensive herbal remedy approach to alleviate the symptoms of neurodegenerative diseases [16].

Infertility treatment

Oxidative pressure is a key issue worried in male infertility, which is due to an unnatural increase in environmental loose radicals. In the majority of cases, this has a terrible impact on a male's ability to impregnate a girl. Currently, it is believed that spermatozoa can be included in opposition to the damages brought on with the aid of oxidative pressure by way of saturating sperm with antioxidants [17].

The antioxidant role of *Phoenix dactylifera* pollen is capable of collecting the reactive oxygen and neutralizing it in and out of body cells. The present research offers an evaluation of the antioxidant roles of *Phoenix dactylifera* pollen on male infertility. This research is based on English-Language research and articles located with the aid of comprehensively reviewing electronic databases, web sites, books, and academic articles over the past 10 years. The phenolic compounds of *Phoenix dactylifera* pollen, because of the existing polyphenols, are robust chelators of heavy metals. Therefore, they are effective in casting off environmental hydroxyl radicals [17].

Moreover, those flora have high capacities of eliminating hydroxyl loose radicals, picrylhydrazyl, biphenyl and *Phoenix dactylifera* pollen and additionally inhibiting glutathione-S-transferase (GST). The records display that currently, the usage of herbal antioxidants to neutralize reactive oxygen species (ROS) and reduce the bad effects of oxidative pressure on frame cells and tissues has attracted researchers' interest [17].

Various substances, consisting of flavonoids and catechism, perform their antioxidant function through increasing the attention of glutathione peroxidase. The final product of this method is an increase inside the variety of motile sperm, which can have good sized consequences on fertility [17].

Antimicrobial

Emphasized that pollen is a male flower gametophyte located within the anthers of stamens in angiosperms and a vast source of compounds with health shielding ability. In the prevailing paintings, phytochemical screening turned into finished as properly as analysis of the antioxidant and antibacterial properties of pollen extracts from Micromere fruticosa, Achilles fragrantissima, and *Phoenix dactylifera* growing wild in Palestine. Phytochemical screening examined the total flavonol, flavone and phenolic content material [18].

The DPPH (1,2-Diphenyl-1-Picrylhydrazyl) and FRAP (ferric decreasing antioxidant energy) methods have been used to evaluate antioxidant propriety, and disc diffusion, minimum inhibitory and bactericidal awareness checks have been used to check the pollen extract's antibacterial activity in opposition to multidrug-resistant (MDR) medical isolates. The maximum level of overall phenolic was determined in the extract of Micromere fructose (fifty-six.78 ± 0.49 mg GAE (Gallic Acid

Equivalent)/g). The flavone and flavonol content material of samples ranged from 2. Forty-eight ± 0.05 to 8.03 ± 0.01 mg QE (Quercetin Equivalent)/g. *Micromeria fruticosa* pollen with IC50 values of zero 047 and 0.039 mg/mL within the DPPH and FRAP assays, respectively, showed the best radical scavenging action. In addition, this pollen confirmed a slight antibacterial motion towards the microorganisms studied, with MICs varying from zero.625 to 10 mg/mL and inhibition diameters ranging from thirteen.66 ± 1. Five to sixteen.33 ± 1. Five mm [18].

Wound healing

Emphasized that oil palm (Ealey's guineensis Jack.) leaves (OPL) are broadly available at zero fee in Southeast Asia countries, particularly in Malaysia and Indonesia due to big-scale oil palm plantations. OPLs include a large number of flavonoids in unique flavonoid C-glycosides, which might be regarded to possess beneficial biological houses consisting of antioxidant and wound restoration residences. The present study aimed to evaluate the wound recovery efficacy of OPL in numerous solvent extracts and flavonoid enriched fractions and to determine the contribution of flavonoid C-glycosides (orient in, disorienting, vitamin, and isovitexin) using in-vitro scratch assay on 3T3 fibroblast cells. Solvent crude extracts with exceptional polarity have been screened and the maximum energetic extract turned into subjected to acid hydrolysis. The crude and acid hydrolyzed extracts have been further enriched using macroporous resins, XAD7HP. UHPLC-UV/PDA and LCMS/MS analysis have been implemented for the identification and confirmation of flavonoid C-glycosides. The wound recovery houses produced from mobile viability, cell proliferation, and cell migration have been studied [19].

Allantoin was used as a high-quality manipulation to compare the efficacy of most of the tested samples. The results found out all OPL crude extracts, flavonoid enriched fractions, and flavonoid C-glycosides have been non-poisonous at concentrations below 25 µg/mL and confirmed better cellular proliferation and migration activities at low concentrations than higher concentrations. This has a look at also validated orient in, disorienting, vitamin and isovitexin presented in OPL extracts and flavonoid enriched fractions stimulated proliferation and migration of 3T3 fibroblast cells. Hence, those findings may additionally pose capacity healing bioactive retailers for wound healing by way of enhancing fibroblast proliferation and migration [19].

Removal of pollutants

Mentioned that many industries discharge untreated wastewater into the environment. Heavy metals from many commercial techniques turn out to be as dangerous pollutants in wastewater. Heavy metallic pollutants have multiplied in recent decades and there's a developing subject for the general public fitness danger they may pose. To put off heavy steel ions from polluted waste streams, adsorption tactics are the various maximum commonplace and effective treatment techniques. The adsorbents that are used to remove heavy steel ions from aqueous media have both advantages and dangers. Cost and effectiveness are two of the most outstanding criteria for deciding on adsorbents. Because the fee is so essential, the awesome effort has been extended to study and locate powerful decrease-value adsorbents. One elegance of adsorbents that is gaining enormous attention is agricultural waste [20].

Among many alternatives, palm oil biomasses have proven promise as powerful adsorbents for putting off heavy metals from wastewater. The palm oil industry has hastily elevated in recent years, and a large amount of palm oil biomass is available. This biomass is a low-price agricultural waste that reveals, both in its uncooked form or after being processed, the capacity for removing heavy metal ions from wastewater. In this article, background statistics are provided on oil palm biomass and studies that imply its capability as an alternative adsorbent for getting rid of heavy metal ions from wastewater are described. From having reviewed the cogent literature on this subject matter we are advocating that low-value oil-palm-associated adsorbents have already validated incredible elimination talents for various pollution. Because fees are so vital to those who select easy waste streams by using the use of adsorbents, using cheap resources of unconventional adsorbents is more and more investigated [20].

An adsorbent is considered to be cheaper while it's miles effortlessly to be had, is environmentally friendly, is price-effective, and be efficiently utilized in cost-effective procedures. The benefits that oil palm biomass has include the following: available and exists in abundance, appears to be powerful technically, and can be integrated into present strategies. Despite those blessings, oil palm biomasses have disadvantages which include low adsorption potential, multiplied COD, BOD, and TOC. These risks can be conquered by modifying the biomass both chemically and thermally. Such change creates a charged surface and will increase the heavy steel ion binding ability of the adsorbent [20].

Conclusion

The date palm is one of the oldest cultivated fruit trees and plays a significant role in tropical regions where it is one of the most abundant and important trees. There are approximately 2,600 species of palm trees, most of which thrive in tropical, subtropical, and warm temperate climates. Date palms are resilient, capable of withstanding high temperatures and low water conditions, and their fruit can be dried for long-term storage, providing a year-round source of nutrients. The first mention of the date palm in recorded history is when the Israelites entered the wilderness after leaving Egypt. In Elim, they found palm trees, much like travelers today find palm tree oases in many parts of the Sahara. The date palm's importance is reflected in its depiction in religious texts like the Bible, where it was used to adorn the walls of the temple.

Palm fruit, one of the few fatty fruits, is gaining recognition for its health benefits, providing not only healthy dietary fats but also protective phytonutrients. Research has explored the health effects of dates on the cardiovascular system, glycemic control, diabetes management, lipid profiles, maternal nutrition, neuroprotection, infertility treatment, gastrointestinal health, hepatotoxicity, antimicrobial and antileishmanial

properties, wound healing, and anticancer effects. Dates are considered nearly ideal foods, offering a wide range of essential nutrients and potential health benefits. However, there are risks associated with palm trees and their cultivation. Palm trees can cause accidents, leading to falls and fractures. The thorns can cause injuries such as tissue inflammation, synovitis, hematomas, puncture wounds, septic arthritis, osteomyelitis, and eye injuries. Date palm pollen can trigger allergies, leading to asthma, rhino conjunctivitis (sneezing, runny nose, and nasal blockage), and contact urticaria. Additionally, palm trees can be contaminated by various pathogens and heavy metals.

Despite these risks, date palms and their fruit hold significant value, both nutritionally and culturally. The Bible provides insights into the historical uses of palm trees, and scientific research supports their health benefits. However, it's important to remain aware of potential risks associated with palm tree cultivation and usage. Despite these challenges, the date palm remains a valuable resource for many people around the world.

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