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Research Article

Traditional Process of Dates, COVID-19 Pandemic Observation, and Challenges in Sindh

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Abstract: This study brings to the front the reports on the importance of dates, its local processing, and associated all the challenges in the Thari Mirwah sub-district, Khairpur. A survey was planned to collect data based upon the interviews of local farmers. A questionnaire was structured with a total of 20 respondents (each of 4 per village). The demographic results show that the major proportions of the population under study were male (100 %). A 50 % of them were of an age ranging between 30-50 years. Almost, all the respondents were married, with a literacy rate of 20 %. The analysis showed that the dwellers make use of date fruit at variable stages of maturity and prepare different traditional dishes from the flesh of the fruit. Also, they responded that because of the COVID-19 pandemic, there were observable losses that occurred without any proper attention and influence on a timely harvest and supply chain of date fruit. It is concluded that a strong ethnobotanical relation exists between fruit trees and local dwellers of studied Taluka. Limited studies were conducted about the importance and challenges of date fruit in this area. It is recommended that the consumption of natural fruit with enormous antioxidants may help to trigger effective control over challenging issues of food insecurity or malnutrition, being an indigenous food source for the local population of the studied region.

Keywords: Date Fruit, Health Benefits, Challenges, Processing.

1. INTRODUCTION

Date palm (*Phoenix dactylifera* L.); belongs to the Kingdom Plantae, Palmae (*Arecaceae*) family, phylum Spermatophyta, sub-phylum Angiospermae, and class Monocotyledonae. It is an outstanding drought-tolerant, a lifesaver (for a livelihood in desert situations), healthy fruit. It is well-known nourishment as well as having a financial side [1-6]. Besides, the rest of the parts are also useful, such as leaves that can be used as raw substantial for making the roof of the house. It is an amazing fruit crop significantly cultured in the arid regions of the domain comprising the Arabian Peninsula, the Middle East, and North Africa since pre-historic eras and amongst the eldest plants cultivated on the ground for its eatable fruit [7], broadly planted in hot and dry weather. It is an imperative food means for the people of areas and shows a significant character in daily survival [5,8]. As per the report of the Food and Agriculture Organization 2014, Pakistan was the 6th largest producer of dates. In addition, over 300 varieties have been identified in the country in 2011. The study found that socioeconomic as well as food security situations of areas where date palm grow are poor in Pakistan. Universally, dates are eaten in current cultures for the pleasing flavor, odor, and biting texture, their use for flavoring foods, beverages, and medicine [9] These are a vital part of the diet in the Middle East. Dates play a prominent role in inhibiting human illness promoting well-being advancement as they are the basis of various dietary fibers and other bioactive mixes i.e.

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vitamins, carotenoids, polyphenols, glucosinolates, and minerals. Date palm [9] measured a well-known versatile, with multi-purposes like feed, food, and shelter. It had an extremely maintained national legacy in various sections globally. The key fate of Date palm cultivators is their growth, export, and selling capability [10]. The fruit is classified into basic parts: flesh, skin, pit [8]. The flesh consists of carbohydrates (73–79), total dietary fibers [14-18], ash (2.5), protein, (2.1–3.0) [11], and fat (2.0–3.2) in percent [5]. Dates too possess numerous medicinal abilities such as anti-bacterial, anti-fungal, anti-tumor, anti-ulcer, and immuno-modulatory possessions. An action of antioxidant about Date palm cultivars has been credited to phenolic mixes [5,12, 13, 14]. Traditional harvesting techniques and processing of dates were observed in the studied area. Farmers are not given advancement, awareness, and key attention from the stakeholders, policymakers, and non-governmental as well as governmental bodies. They are facing many obstacles during harvesting, processing, and marketing. During the study period, a major threat named coronavirus was observed with strict restrictions of human mobility, farmers and laborers were at home that results in a big delay in harvesting and processing. To know the socioeconomic importance, traditional processing, and challenges of date palm for a rural population, a study was conducted on dates in the Khairpur district of Pakistan.

2. MATERIAL AND METHODS

2.1 Study Area and Population

A total of five villages were selected for study from Taluka Thari Mir Wah, district Khairpur Mirs, Sindh provinces as depicted in maps below (Fig. 1). Thari Mirwah (a capital city of Mirwah division) is present 45 Km distant from the Khairpur Mirs district located on the Southern side (coordinates 27.068310 ^{o}N and 68.602252 ^{o}E) shown in Fig. 2. The selection of locations was based on the date palm plantation around the area. A compiled survey was taken up, to collect the data regarding date palm fruit, various techniques used in processing, and losses observed during harvesting in association with the human mobility due to COVID-19 pandemic total lockdown on production and supply chain. The current production of date has remained 33000 ha acreage per year. The survey was conducted during the year 2020, from June to July. The selection of 20 random respondents was done from selected villages (4 from each village). The general population i.e., farmers interviewed is for the study. The method of collecting information regarding the fruit-based interviews from local farmers of various age groups residing in rural, semi-urban, and urban areas is followed by Fatima *et al.* [19]. A well-structural questionnaire was developed for the proper study comprising 2-distinctive sections, namely.

1. Demographics of the people working at date palm orchards to monitor the trees and fruits.
2. Information regarding Date Palm fruit harvesting and challenges that farmers were facing and the influence of the current pandemic on a field operation and production.

2.2. Statistical analysis

The data collected from the survey was analyzed according to Snedecor and Cochran [20]. The Statistical Package for Social Sciences (IBM SPSS Statistics 20) was used while percentages and frequencies were used to interpret the findings from the recovered data.

3. RESULTS AND DISCUSSION

3.1 Demographics

Table 1 depicts the demographics of all the respondents. It was observed that all respondents were male (100 %) in taluka Thari Mir Wah which all were married. Out of a total of 20 respondents, 50 % were of the age between 30-50 years. Illiteracy was dominant with 80 % illiterate, only 02 attained educations (Primary and Secondary).

3.2 Ripening, Harvesting, and Traditional Processing

The Ripening steps of dates are starting from Hababauk, a creamy white color appearance that after 1-week changes into another growing form called Kimri, it takes 5 weeks to produce green color and after 17 weeks' yields turning yellow color or red color Kimri. Later, it goes to form Khalal, a yellow or red-colored. Rutab, another phase after Khalal that takes 26-28 weeks to get brown color and finally results in Tamer as depicted in Fig 3.

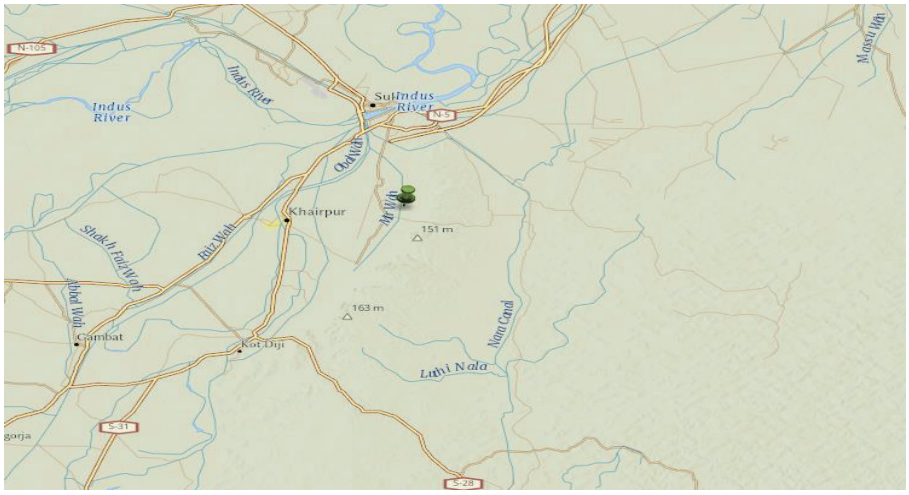

Fig. 1. Map showing Mirwah Sub-district, Khairpur Mirs, Sindh, Pakistan

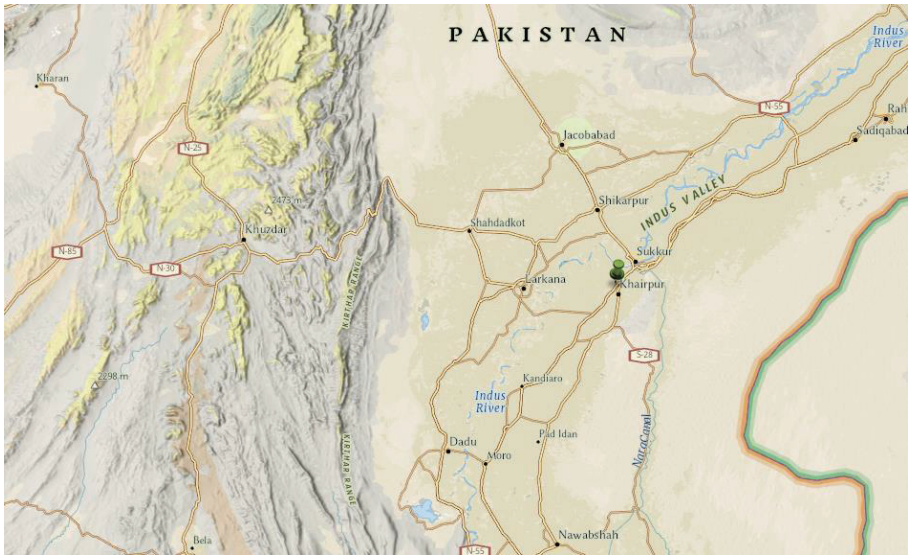

Fig. 2. Map showing Khairpur Mirs district of Sindh, Pakistan.

Table 1. Information regarding demographics of respondents from Taluka Thari Mir Wah

Demographic variables	%	Frequency
Gender		
Male	100	20
Female	00	00
Age (years)		
30-50	50	10
51 above	50	10
Marital status		
Married	100	20.
Unmarried	00	00
Education level		
Illiterate	80	18
Primary	10	01
Secondary	10	01
Matric	00	00
Intermediate	00	00

After maturation or ripening, harvesting was carried out through the traditional way using a sickle, etc., to cut dates bunches manually. Bunches of dates dropped down from the date palm that resulting in dispersion of dates, breakdown, and damage. In this way, a big loss of dates was observed during the study period that is shown in Fig 4. The harvested dates were stored on the farm sometimes covering it or not. The Dates were washed properly and boiled for about half an hour and dried under sunlight for about 12-24 hours to get products more effective and attractive. Sun-drying is the oldest method of drying those results in a long time for dates drying, environmental contamination, and several other factors that can influence the quality of dates.

3.3 Some Health Benefits

It is to believe that the antioxidants in fruit are very significant [14]. Fruits, as well as vegetables, are the main source of antioxidants. Epidemiology depicts that frequent intake might cause the hazard, leading to numerous long-lasting ailments such as cancer, cardiovascular diseases, and diabetes, [16, 17]. Various antioxidants include polyamines, phenolics, and glutathione. Phenolics are hydroxyl-cinnamates, flavonoids, and phenolic acids. The pointed antioxidant activity of dates is related to phenolics.

We can broadly characterize the biological properties produced by phenolics into two core sets. The first set includes anticipation of nucleic acids, lipids, and proteins of oxidative harm [18, 22]. The date fruit has been commercially added in numerous homeopathy drugs to cure various ailments including hypertension, diabetes, cancer [23], atherosclerosis as well as an anti-bacterial, anti-fungal, and immunity modulator [24]. The dietary antioxidants of dates fight against various degenerative problems of our body such as CVDs, neurological, ulcers [25, 26], gastric ulcers by depressing oxidative anxiety [3].

Dates are extremely nutritious food with innumerable health benefits. The fate of Dates as an emergent "healthy" food has been studied by several authors [12, 18]. Seeds are the main waste of marketable handling. Fruits and seeds are of high research focus being high in nutritious aspects [27]. Actuality dioicous plant, both flowers (M/F) are innate on two dissimilar palms.

3.3.1 Antimicrobial properties

Dates have anti-bacterial, antifungal, and antiviral characteristics due to very high phenolic insides. The fruit is very rich in carotenoids, ascorbate, selenium, and many antioxidants. These antioxidants support our body against oxidative harm caused by the

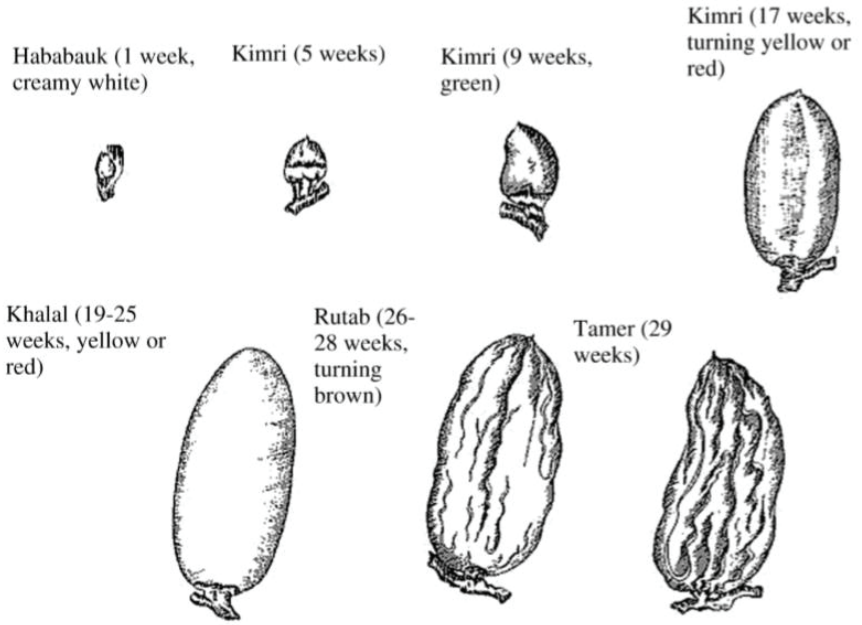

Fig. 3. Different stages of forming and ripening of dates [21]

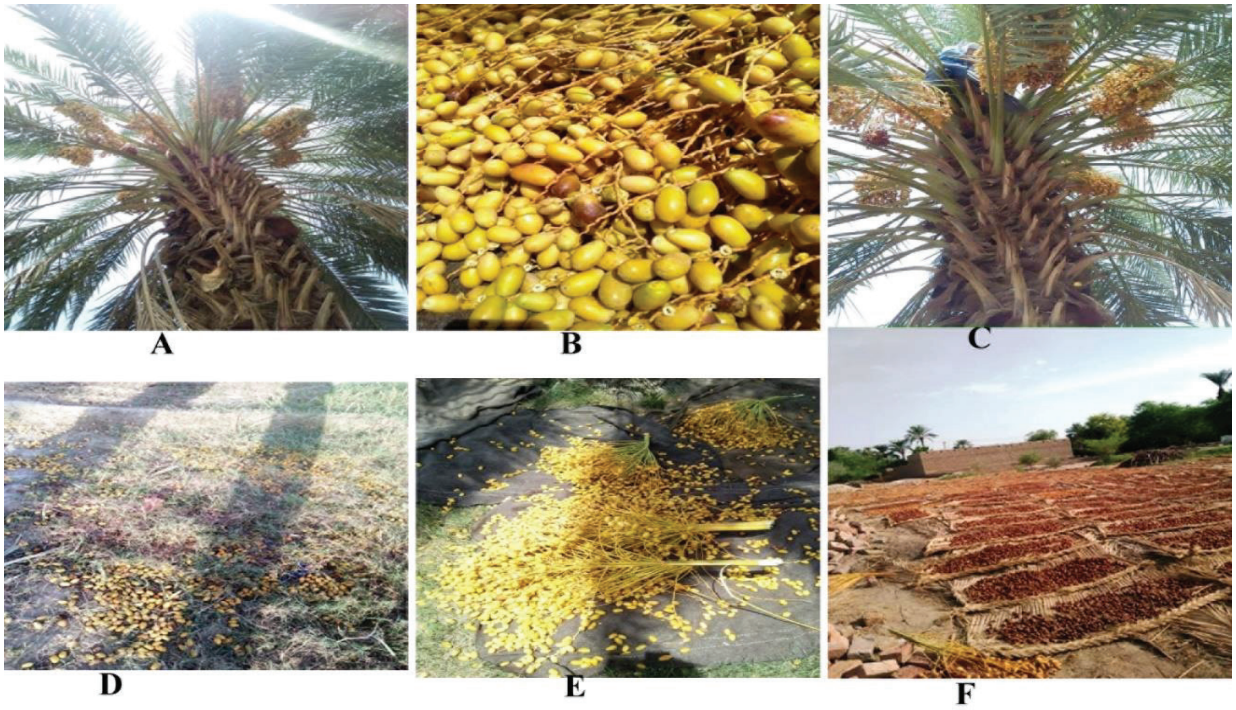

Fig. 4. Different steps of date processing from ripening, harvesting, sorting, grading to traditional drying are shown in A, B, C, D, E and F. A shows a date palm tree in scorching sunlight having ripe mature as well immature dates. In picture B, a bunch of dates is shown. C shows harvesting by hand, D shows a waste of date during the season, E shows a collection of harvested bunches and F shows sun-drying of dates at the local level.

activity of lymphocyte phagocytosis of pests and pathogens.

3.3.2 Anti-tumor and anti-ulcer properties

Almost all phenolics were verified as anticarcinogenic and found rich in dates [28, 29]. These phenolics depress the development of malignant tumors at various steps [30]. The anticancer activity of phenolics may be helpful to stop the enzymes catalyzing the development of pro-carcinogens [5, 31]. Caffeic and ferulic acids are major acids in dates that hinder the growth of skin tumors [32].

3.3.3 Immuno-modulatory properties

Dates have elevated fiber and phenolic contents that have a role in the inhibition of cardiovascular ailments and variation of an immune system. Stoppage ailments are resulted inhibited platelet accumulation and low-density lipoprotein oxidation. Phenolics with anti-inflammatory and anti-thrombotic results may be effective in minimizing the pressure of blood [33]. Additionally, phenolics also inhibit the activity of α-glucosidase and α-amylase to increase blood glucose levels [34, 35]. The immuno-modulation of phenolics involves anti-inflammatory responses which are triggered by the suppression of pro-inflammatory pathways.

3.3.4 Bioactive compounds in date fruit

The composition and nutritional value proposed that it has a good blend of fiber, invert sugars, and antioxidants. Date seeds with high-value anti-oxidants might be due to the good defense of seeds, the most fundamental constituent for plant beings. It states that the supreme total phenolic content is associated with dehydrated fruits i.e. apricots, plums, raisins, figs, and cranberries [36]. The antioxidant and phenolic content capability of Dates of Middle Eastern countries calculated broadly directing on dates grown in Oman [37, 38], Algeria [39], Saudi Arabia [4], and Iran [40]. It is ironic with bioactive mixes as shown in Table 2, studied by different researchers.

3.4 Dates Processing and Value-adding

Ordinary treatments involve the elementary stages

of fumigation, physical categorization, washing, desiccation, classification, and packing as well. More progressive methods for 1st mark dates include value-adding phases namely, removal of seeds also called pitting, earlier packing, refilling of dates without seed in eatable nutty products, packaging separate in good resources. 2nd and 3rd degree dates include, agglomeration then sorting that yields bits/pulp used (breakfast cereal or confectionary products, Dates paste, syrup concentrate, and wine, etc.) Pastes have a high market due to having uses i.e. fillers, binding components, and sweeteners. Dates bars comprising almonds, cereals, and sesame seeds were established. An assessment of juice handling data, interim goods, and end-products e.g., chaotic, or dim date juice and unblemished date sugar resolution brought is done. Complex Dates structures along with business techniques of numerous value-added products are defined [42].

Dates are particularly delightful fresh fruit by straight eating complete Dates are usually made variety diverse goods like date juice concentrates i.e., syrup, spread, and liquid sugar, agitated goods i.e. alcohol, wine, organic acids, vinegar and date pastes for varied uses (e.g., confectionery, bakery). Similarly, end-products of data processing are used for diverse energies [42]. Provide excellent taste to the final product and integral in food measures i.e. snacks, sweets, baking products, confectionery, health foods, and official feeding [7].

3.5 Varieties

In our country Pakistan, many varieties of dates have been observed, Begam Jangi, Aseel, Dhakki, Fasli, Karabalian, Halawi, and Muzawati, etc. [43]. Pakistan was graded 7th in all rest countries producing data during 2011. The country produces above 150 varieties of dates generally in Baluchistan, districts of Punjab and Sindh. Aseel and Dhakki are leading types. Dates are ordered semi-soft, soft, and dry dates [44]. In Pakistan, varieties come in a group of semi-dehydrated dates, highly rich in sugars (~81-88 %, mostly glucose, fructose, sucrose), dietary fiber (~5-8.5 %) and insufficient in additional

Table 2. Different properties of Dates and bioactive compounds

Compounds/ plant parts	Characteristics	Sources
Date fruit	Antimutagenic	[46]
	Neuroprotective	[47]
	Anti-allergic	[48]
	Cellular resistant motivation	[48]
	Anti-diabetic result	[49]
	Defense to stress in a liver of rat due to oxidation	[50]
	As a medicinal food	[12]
Flavonoid sulfates	During maturing and large volume of procyanidin/tannin at khalal stage	[51]
43 volatile compounds	Noticed in Tunisian Dates at various maturity phases	[52]
Phenolic compounds (anti-oxidants)	A defensive role for humans and plants in contradiction of antagonistic ecological surroundings, offering confrontation against microbial and parasitic contaminations	[53, 54, 55]

Table 3. The Nutritive contents of Dates with its properties

Parameters/elements	Quantity and properties	Source
Protein, moisture, fat, carbohydrates, and ash of Dates /100 g (wet)	42.4%, 1.5%, 0.14%, 1.16%, and 54.9%, separately. 16 varieties including Deglet Nour and Barhee.	[12,18,57,58]
potassium content in Deglet Nour and Medjool types.	96, 6.56 mg/g (wet weight), individually.	[18]
Carbohydrates in palatable flesh	70-80% (glucose, fructose)	[5,18,58]
Sugar content	Above 50%, declared a tree of life	[34]
consumable sugars generally glucose, sucrose, and fructose dietary fibers and enfold fewer proteins and fats	(70%), pulp hold it and bounded vitamins like riboflavin, biotin, thiamine, ascorbic, and folic acid that are vital for the body	[18]
Phosphorus, calcium, copper, iron, cobalt, fluorine, magnesium, potassium, manganese, sodium, boron, copper, zinc, sulfur, and selenium.	Good amount.	[18,59]
Oil	0.2-0.5% fleshy material of dates and seed holds 7.7-9.7%	[57]
Numerous nutrients	Dates embraced	[60]
Sugar, dietary fiber, minerals	Mineral and vitamins turn dates nutritionally further vital for mankind.	[61,62]
Rich in fat-soluble and water-soluble vitamins	Due to functional and nutritional ingredients, dates share an important part of human health and diet	[60]
15 different minerals	rich source of minerals	[63]
Vitamins	wanted by the human body for growth, waste removal, and digestion	[64]
Minerals	Involvement with organic doings, behave as catalysts in metabolic feedbacks of the body.	[65, 66, 67, 68, 69]
	Crucial for digestion, creation of nerve compulsion, engagement of food nutrients.	[62,66,67,70,71]
polyphenols and tannins	valuable to cure intestinal hitches	[72]

Table 4. Harvesting the season of dates, challenges, and an impact of COVID-19

Region	Harvesting time	Challenges	Investment	Effect of COVID-19
Khairpur Mirs is the hub of Date palm trees. The study was conducted in Thari Mir Wah villages	July-Aug each year	Rain Whitefly attack Low market value Diseases Water shortage Loss during harvest i.e., 40% The negligible focus of government on date palm trees and fruits	A lot of investment is needed. Approximately values are, Labor cost- 400 Cost of 1 sack of fertilizer per acre 200 per tree for pollination 50 per tree chemical cost	Not timely harvest Labor shortage due to lockdown, human mobility. No proper look after A whitefly attack was not measured early. No Marketing No Export to other countries.

nutrients [45].

3.6 Nutritional Value of Dates

It is rich in nutritive properties with enormous macro-nutrients as well as micro-nutrients shown in Table 3. It also contains phytochemicals that improve the nutritious and organoleptic possessions of the fruits [1, 2, 56].

Due to Vit-C and E, dates have antioxidants properties [18]. 100g of dried dates contains 193.7-239.4 mg of phenolic mixes, Some varieties have improved compounds after drying issue of these compounds from tannins afterward ruin through temperature and enzyme growth [37].

3.7 Challenges

One of the biggest challenges of the date palm is R. ferrugineus (an unseen and deadly tissue borer) with verminous palms in the initial phase of the outbreak. These palms respond to different chemical actions and can be saved unlike palms in the progressive stage of occurrence, where larvae cause wide tissue losses. The infestation mostly occurs at the base of the tree trunk near soil [73], whereas in P. canariensis the crown is typically damaged [74].

The tree can rise in a terrestrial array, specified circumstances are obligatory in blooming of flowers as well as the growth of fruit. The lengthy heat of summer is very good for the maturation of the fruit, while rainy and highly moisture conditions resulted in cracking, darkening, agitating, and mold growth of fruit [75]. While fruits can survive in a harmed situation like elevated (45-50 °C) and low temp. (–7 °C). Further, results show that it is a delicious fruit, consist of carbohydrates, protein, minerals, and vitamins. A study reported that one kg contains 2500-3000 calories [76].

Currently, the COVID-19 pandemic has left footprints on agriculture and food security as well; therefore, people interviewed deny sharing the information about different risks for the production of both quality and quantity of fruit due to various factors. These factors include harvesting, rainfall during fruit ripening, whitefly attack, a high cost of investment, lockdown, and lack of restricted human mobility presented in Table 4.

4. CONCLUSION

It is concluded from the present survey study that Dates are very ideal dietary intake for human health because of the enormous antioxidants, phenolic compounds and bioactive elements contained. If consumed properly the fruit can prevent numerous chronic ailments to ensure public health. Therefore, keen attention is required by various governmental and non-governmental organizations to empower our farmers with trending technologies to decline losses and mitigate other biotic and abiotic impacts on the quality and quantity of fruit.

5. RECOMMENDATIONS

There is a further need for research studies to be carried out to educate people regarding its dietary importance and get rid of ailments by evaluating nutritional characteristics and other quality parameters.

6. ACKNOWLEDGMENTS

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7. AUTHOR CONTRIBUTIONS

All authors have contributed equally to perform this study.

8. CONFLICT OF INTEREST

The authors declared no conflict of interest.

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