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Study of Sugar Profile by High Performance Liquid Chromatography (HPLC) in Different Brands of Honey, Jam and Jelly

Monika Yadav¹, SK Aktar Hossain², Binod Kumar Bharti³, Prachi K Wasnik⁴

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Abstract

Aim: Toevaluate of sugar profile for Honey, Jam and Jelly by using high performance liquid chromatography (HPLC). *Material and Methods:* Three samples of different brands of Honey, jam and jelly were collected from Reliance shopping mall located in Dwarka, New Delhi.Sugar profile for Honey, Jam and Jelly were evaluated by using high performance liquid chromatography (HPLC). *Results:* The amount of sucrose was found higher than the amount fructose and glucose in Jam samples and this sugar found to be in the range of (21.44-34.93), highest value present in T3-34.93. In honey glucose found to be in the range of (31.76-36.02) which is higher than sucrose (16.95-19.06), fructose (22.79-33.66). The highest glucose value present in T1-36.02. In Jelly, sucrose was found to be as higher than the glucose, fructose and maltose. Maltose recorded as not detectable accept only the (T3-6.25) sample of jelly. *Conclusion:* Sucrose was found to be in high amount in the product of jam and jelly and this sugar contain a large amount of fructose (50%). So, intake of this sugar is harmful to our body because fructose is metabolized only by liver that means a large amount of VLD is produced along with fat. Also, it cannot be controlled by brain as brain resists leptin (a protein for energy intake regulation and to check the efficacy of metabolism). In honey, glucose was found to be in high amount and this sugar level was above the limit of FSSAI. Excess consumption of glucose causes cardiovascular diseases so this honey is not good for human health.

Key Words: Jam; Jelly; Honey; Fructose; Glucose; Maltose; High Performance Liquid Chromatography.

Introduction

Sugar is providing energy for running of the living body, ATP and some other physiological activities of the human body. Sugar plays a variety of functions in food products. It provids a sweet taste and also maintains desirable appearance, colour, flavour, body and texture of product. The

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preservative effects of sugar in food products such as jam and jellies are also well recognised. Some researchers found that removing fat from the foods to make their taste to the low-fat food industry and has also utilize the sugar to maintain their taste of food products. The last 10 to 20 year has been linked that over consumption increase in fructose cause metabolic disorder like cardiovascular diseases (Rizkalla, 2010), diabetes (Goran et al., 2013). hypertension (Korkmaz, 2008). dyslipidemia (Stanhope, 2012) and obesity (Olsen et al., 2008). Fructose also increases the incidence of hypertension and diabetes (Rebolloet al., 2012).

Honey is made when the nectar with sweet deposits from the plants are gathered, modified and stored in the honeycomb by the honey bees. It includes water or some other sweeteners (Riddle, 2001). Honey is generally consumed as a natural product, it is desirable for its taste and nutritional value. Honey also increases the health benefits. Since ancient times, honey consumption is generally used with its medicinal properties. Its traditionally used for healing wounds and burns and for the treatment of colds and also sore throats. Recently, several studies have related honey with other medicinal effects, as it was shown that to have antibacterial, hepatoprotective, hypoglycemic, antihypertensive, gastroprotective, antifungal, anti-inflammatory and antioxidant effects (Frans et al., 2001). HPLC methods has been found to be an effective method for the separation of sugars. Two articles were used as the starting point for analysis of fructose and glucose in honey by HPLC (Victoritaet al., 2008), Honey was analyzed to compose a sugar profile for this honey (Cizmariket al.,2004).

It consists of different types of sugars, fructose and glucose are the main Contributors (Alvarez-Suarez et al.,2010). The sucrose content in honey depends upon the degree of ripeness (Belay et al., 2013). High content of sucrose is an indication for its early harvest of the honey, i.e. a product in which the sucrose has not been fully transformed into glucose and fructose by the action of invertase enzymes. Generally, the sucrose content of honey should not more than 5% for reliable honey samples (Bogdanov et al.,1999).

Jam is the product with a suitable consistency and it made from the whole fruits, pieces of fruits, unconcentrated and/or concentrated fruit pulp of one or more kinds of fruit, which is mixed with food stuffs with sweetening properties with or without the addition of water (CODEX, 2009). The main ingredients of fruit jam are fruit pulp, sugar and glucose syrup, thickeners (E-440, E-410) and citric acid to bring the maintained pH into desired range (Javanmard and Endan, 2010). Sugar is one of the most important ingredients of jam for deciding the its rheological properties. It renders to shelf stable enhances taste and also improves the texture of the product. The re-crystallization of sugars in jam is also considered a major imperfection which is usually caused by high amount of sugar in the recipe. Sucrose is considered a better option for preparation of jams as compared to glucose because it has low tendency to re-crystallize (Javanmard and Endan, 2010). At low pH during the manufacturing process sucrose is converted into two components such as glucose and fructose, it is desirable because it reduces the potential of sugar to form crystals (Cancelaet al., 2005).

Jellies are the products of semisolid gelled consistency and it is made from the juice and/ or aqueous extracts of one or more fruits or vegetables, mix with foodstuffs with sweetening properties with or without the addition of water (Codex Alimentarius Commission, 2009). It is made by cooking of fruit juice with sugar. Jelly should not have gummy, sticky, syrupy or have crystallized sugar. The product should be free from dullness with no syneresis and neither tough nor rubbery. Pectin, water, acid and sugar are four major ingredients of jelly. Sugar is the essential constituent of Jelly and it also imparts to its sweetness and body. If the concentration of sugar is higher, the jelly retains less water resulting in a stiff jelly because of dehydration (Srivastava and kumar, 2007). Jellies are crystal clear jams, produced using filtered fruit juice instead o fruit pulp.

Jams and jellies were originated as an early stages to preserve the fruit for consumption in the off-season (Baker et al., 2005). In traditional manufacturing of jam and jelly, all the ingredients are mixed in adequate proportions, and the mix concentrated by also applying a thermal treatment to reach the required final soluble solids content. This process also implies an undesirable impact on colour, nutritional value and flavour properties due to the high temperature has been reached in the cooking process.

Material and Methods

All experiments were carried out at the Department of Food Technology, Warner College of Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad and Research Lab "FICCI Research and Analysis centre plot no.2A, Sector 8 Dwarka, New Delhi-110077.

Material Required

Three samples of Honey, jam and jelly were collected from Reliance shopping mall located in Dwarka, New Delhi. All the samples were collected freshly in sterile containers and stored at ambient temperature until analyse. All chemicals and reagents were used of analytical grade. Glassware used in study were test tube, petri dish, beaker, measuring cylinder, glass rod, micro pipette, centrifuge, vial and filter membrane. HPLC (High Pressure Liquid Chromatography) Agilent technologies Inc. 2012 were used.HPLC methods is a technique used to separate, identify and quantify each component in a mixture (Fig.1). The liquid sample enters the HPLC system through the injection system port and is also pushed through the chromatography column by degassed solvent delivered under high pressure by a pump (Fig.2). Components of the sample are detected by a detector and analysed

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11

CD

0.45

0.18

0.15

Data represent the means of three replicates. Values bearing different superscripts in each row differ significantly (P < 0.05)



Fig. 3: Graph depicting average percentage of Fructose in different jam samples.

The mean value indicate that sample T2 has highest concentration of fructose (25.09) followed by the sample T1 (19.28) and the lowest value was obtained by sample T3 (16.68).

As evident from the result of ANOVA shows that F calculated value (1383.794) is more than the F tabulated value (6.944) at 5% level of significant. Therefore, the difference was significant between different jam samples. It was further analysed that the difference between the mean value of T1-T2 (5.81), T1-T3 (2.60) and T2-T3 (8.41) was more than the C. D. Value (0.45). Therefore, the difference was significant.

Glucose (g/100)

Glucose in different sample of jam, in triplicate, the mean value of glucose (g/100g) was found to be 12.30 to 20.61 for different sample (Fig. 4). The mean value indicate that sample T_2 has highest concentration of Glucose (20.61) followed by the sample T_1 (20.45) and the lowest value was obtained by sample T3 (12.30).



Fig. 4: Graph depicting average percentage of Glucose in different jam sample.

The ANOVA resultsshows that F calculated value (10811.26) is more than the F tabulated value (9.944) at 5% level of significant. Therefore, the difference was significant between different jam samples. The difference between the mean value of T_1 - T_3 (8.15) and T_2 - T_3 (8.31) was more than the C. D. value

(0.18). Therefore, the difference was significant and the difference between the mean value of T_1-T_2 (0.15) was less than the CD. Value (0.18). Therefore, the difference was non-significant.

Sucrose (g/100g)

Sucrose in different sample of jam, in triplicate, the mean value of sucrose (g/100g) was found to be 6.03 to 34.93 for different sample (Fig. 5). The mean value indicate that sample T_3 has highest concentration of sucrose (34.93) followed by the sample T_1 (21.44) and the lowest value was obtained by sample T_2 (6.03). C.D. value at 5% was observed 0.15 and S.Ed. value was 0.05.



Fig. 5: Graph depicting average percentage of Sucrose in different jam sample.

The result of ANOVA table shows that F calculated value (147803.1) is more than the F tabulated value (6.944) at 5% level of significant. Therefore, the difference was significant between different jam. It was further analysed that the difference between the mean value of T_1 - T_2 (15.42), T_1 - T_3 (13.49) and T_2 - T_3 (28.90) was more than the CD. Value (0.15). Therefore, the difference was significant.

Maltose (g/100g)

Maltose in different sample of honey, in triplicate, the mean value of maltose (g/100g) was found to be as ND for different sample.

Honey

Fructose (g/100g)

Fructose in different sample of Honey, in triplicate (Table 2), the mean value of fructose (g/100g) was found to be 22.79 to 33.66 for different sample (Fig. 6).

Table 2: Analysis of sugar profile of honey.

Parameter	Treatment (g/100g)			
	T ₁	T_2	T ₃	CD
Fructose	33.66ª	22.79°	23.83 ^b	0.23
Glucose	36.02ª	30.22 ^a	31.76ª	0.12
Sucrose	0.00	16.95	19.06	0.01
Maltose	ND	ND	ND	_



Fig. 6: Graph depicting average percentage of Fructose in different honey samples.

The mean value indicate that sample T_1 has highest concentration of fructose (33.66) followed by the sample T_3 (23.83) and the lowest value was obtained by sample T_2 (22.79).

As evident from the result of ANOVA given that F calculated value (10042.81) is more than the F tabulated value (6.944) at 5% level of significant. Therefore, the difference was significant between different honeys. It was further analysed that the difference between the mean value of T_1 - T_2 (10.87), T_1-T_3 (9.83) and T2-T3 (1.04) was more than the C. D. Value (0.23). Therefore, the difference was significant.

Glucose in different sample of honey, in triplicate, the mean value of glucose (g/100g) was found to be 30.22 to 36.02 for different sample (Fig. 7). The mean value indicate that sample T_1 has highest concentration of glucose (36.02) followed by the sample T_3 (31.76) and the lowest value was obtained by sample T_2 (30.22).



Fig. 7: Graph depicting average percentage of Glucose in different honey samples.

Sucrose in different sample of honey, in triplicate, the mean value of Sucrose (g/100g) was found to be 16.95 to 19.06 for different sample (Fig. 8). The mean value indicate that sample T₃ has highest concentration of Sucrose (19.06) followed by the sample T_2 (16.95) and the zero value was obtained by sample $T_1(0.00)$.

The ANOVA shows that F calculated value (29481172) is more than the F tabulated value (6.944) at 5% level of significant. Therefore, the difference was significant between different honeys. It was further analysed that the difference between the mean values of T_1 - T_2 (16.95), T_1 - T_3 (19.06) and T_2 - T_3 (2.11) was more than the CD Value (0.01).



Fig. 8: Graph depicting average percentage of Sucrose in different honey samples.

Therefore, the difference was significant. The data pertaining to maltose in different sample of honey, in triplicate that the mean value of maltose (g/100g) was found to be as ND. for different sample.

Jelly

Fructose in different sample of Jelly, in triplicate (Table 3) that the mean value of fructose (g/100g)was found to be 0.78 to 13.58 for different sample (Fig. 9). The mean value indicate that sample T_1 has highest concentration of fructose (13.58) followed by the sample T_3 (6.68) and the lowest value was obtained by sample T_2 (0.78). Similar, findings was observed by (Giulio, 2006).

Table 3: Analysis of sugar profile of jelly.

Parameter	Treatment (g/100g)			
	T_1	T ₂	T_3	CD
Fructose	13.58a	0.78b	6.69b,c	6.75
Glucose	23.30	0.36	17.17	S
Sucrose	27.10a	17.85b	36.95c	0.01
Maltose	0.00	0.00	6.25	-

As evident from the result of ANOVA shows that F calculated value (13.89425) is more than the F tabulated value (6.944) at 5% level of significant. Therefore, the difference exists a significant between different jelly samples. It was further analysed that the difference between the mean value of T_1 - T_2 (12.80) and T_1 - T_3 (6.87) was more than the CD. Value (6.75). Therefore, the difference was significant. The difference between the mean value of T_2 - T_3 (5.91) was less than the CD. Value (6.75). Therefore, the difference was non-significant.



Fig. 9: Graph depicting average percentage of Fructose in different jelly samples.

Glucose in different sample of jelly, in triplicate that the mean value of glucose (g/100g) was found to be 0.36 to 23.30 for different sample (Fig. 10). The mean value indicate that sample T_1 has highest concentration of Glucose (23.30) followed by the sample T_3 (17.17) and the lowest value was obtained by sample T_2 (0.36).



Fig. 10: Graph depicting average percentage of Glucose in different jelly samples.

Sucrose in different sample of Jelly, in triplicate that the mean value of sucrose (g/100g) was found to be 17.85 to 36.95 for different sample (Fig. 11). The mean value indicate that sample T_3 has highest concentration of sucrose (36.95) followed by the sample T_1 (27.10) and the lowest value was obtained by sample T_2 (17.85). It was further analysed that the difference between the mean value of T_1 - T_2 (9.25), T_1 - T_3 (9.85) and T_2 - T_3 (19.10) was more than the CD. Value (0.01). Therefore, the difference was significant.



Fig. 11: Graph depicting average percentage of sucrose in different jelly samples.

Maltose in different sample of jelly, in triplicate, that the mean value of Maltose (g/100g) was found to be 0.00 to 6.25 for different sample (Fig. 12). The mean value indicate that sample T_3 has only the concentration of Maltose (6.25) followed by the sample T_1 and T_2 (0.00).



Fig. 12: Graph depicting average percentage of maltose in different jelly samples.

Conclusion

In this study, three samples of honey, jam and jelly were investigated for sugar contents by using the instrument HPLC. Sucrose was found to be in high amount in the product of jam and jelly and this sugar contain a large amount of fructose (50%). So, intake of this sugar is harmful to our body because fructose is metabolized only by liver that means a large amount of VLD is produced along with fat. Also, it cannot be controlled by brain as brain resists leptin (a protein for energy intake regulation and to check the efficacy of metabolism). In honey, glucose was found to be in high amount and this sugar level was above the limit of FSSAI. Excess consumption of glucose causes cardiovascular diseases so this honey is not good for human health.

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Nutrition Crisis in COVID-19

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Abstract

Ever since the new corona virus pandemic outbreak, a plethora of research studies on nutritional aspect have been conducted and published. This review considers how malnutrition across all its forms of undernutrition, micronutrient deficiencies and overnutrition may influence both susceptibility and progression of, COVID-19. Relevant Papers were identified from Science Direct, Google Scholar and pubmed by using all combinations of the search terms related to COVID-19 and immunonutrients.

Key-words: COVID-19; Malnutrition; Immunonutrients.

Key Messages (Provide appropriate messages of about 35-50 words to be printed in centre box): The elderly are considered one of the most heterogeneous and vulnerable groups, with an increased risk of imbalances, deficiencies and nutritional problems. The consequences of malnutrition in the group result in an increase in the prevalence of infections, longer-stay hospitalizations and increased morbidity and mortality.

Introduction

The Covid 19 pandemic has largely affected the survival rate, health and nutrition of many due to the breakdown in economic machinery worldwide. COVID19hasled to many nutrition-related theories, some of them backed by a biased interpretation of evidence. Areas of interest include the role of macronutrient intake, gut microbiota, dietary fibre, B vitamins, other minerals, phytochemicals, and carotenoids.¹

Malnutrition

Body composition, decrease in lean body mass

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and high fat, are consistently linked to decrease in prognosis rate in many different diseases. Malnutrition results in an increase in the prevalence of infections, longer-stay in hospital and increased morbidity and mortality.¹ Elderly individuals and patients with comorbidities like obesity, diabetes, and hypertension show a higher risk of hospitalization, severe disease, and mortality due to acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. There are many standards for assessing nutritional status in the elderly population, though the method recommended by the European Society of Parenteral and Enteral Nutrition (ESPEN) is the Mini Nutritional Assessment (MNA). The MNA is the method most commonly used for assessing the nutritional status of older people.

There are 2 major forms of PEM-kwashiorkor and marasmus. Even with an adequate caloric intake protein inadequacy in the diet, is the major cause of kwashiorkor, Where as consumption of insufficient protein and calories are known to be responsible for marasmus. Few studies, however, have linked these 2 major forms of PEM to higher incidence of infection and mortality.²



Fig. 1: Viscious cycle of Under Nutrition.

Even though there is no current published data on the effect of PEM on the susceptibility and disease progression of SARS-CoV-2 infection in children, studies on other RNA viral infections suggests that undernourished children (Fig-1)are likely to have more severe respiratory and gastrointestinal disease. Protein energy malnutrition is an important cause of immune deficiency through out the world. and resuls in vicious cycle of infection (clinical and sub-clinical).

A hospital in China recruited 182 elderly inpatients with COVID-19 for study to evaluate the nutritional status using the Mini Nutritional Assessment (MNA). Based on MNA scores the study found that the prevalence of malnutrition was high in elderly patients with COVID-19. The study concluded that nutritional support to be strengthened during treatment, especially for those with diabetes mellitus, low calf circumference, or low albumin.³

Body weight and diabetes

The role of overweight (body mass index (BMI) = 25.0-29.9 kg/m2) as in particular obesity $(BMI \ge 30 \text{ kg/m2})$ in predisposition to respiratory tract infections (RTIs) constitute an important morbidity factor in our society and also leads to considerable cost in economic terms. The study confirmed association between obesity and RTI.

A continuous low-degree inflammation occurs in obesity .It is considered as the major reason towards the progression to insulin resistance and type 2 diabetes. In lean subjects the immune environment is non-inflammatory. The adipose tissue is infiltrated by pro-inflammatory macrophages and T-cells, leading to the accumulation of pro-inflammatory cytokines like interleukins and TNF- α . A decrease in plasma vitamin C levels has been observed in type 2 diabetes by many studies. This may be reason behind major cause of increased need for vitamin C in type 2 diabetes and reason behind high level of oxidative stress caused by hyperglycemia.⁴

Genetic evidence in line with cardiovascular perspective trial studies has proved obesity (and excess fat mass) as an important cause for hypertension, diabetes mellitus, coronary heart disease, stroke, atrial fibrillation, renal disease, and heart failure. It is considered as single most and important risk factor for severe COVID-19



Fig. 2: Comorbidity among COVID-19 patients.

Source-Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis.Weijie Guan, Wen-hua Liang, Yi Zhao, Heng-rui Liang, Zi-sheng Chen, et.al. European Respiratory Journal May 2020, 55 (5) 2000547; DOI: 10.1183/13993003.00547-2020 infection, Obesity reduces protective cardio respiratory reserve and initiates the dysregulation of the immune system. In general the integrated metabolic regulation required for complex cellular interactions, and host defense mechanism is lost thus leading to immune deficit.

Diabetes is supposed to be a common comorbid condition (Fig. 2) among COVID-19 patients with poor outcomes. Hyperglycaemia in patients with and without a history of diabetes can indicate a poor recovery rate. A retrospective study by Wang et al on COVID-19 patients who underwent an HbA1c test during admission found High HbA1c level and associated with inflammation, hypercoagulability, and low SaO2.⁵

Antioxidants

During severe COVID-19, the SARS-CoV2 virus can induce a strong host immune response. This can result in the production of high levels of free radicals by both macrophages and neutrophils and induces severe oxidative stress leading to protein and lipid oxidation . Increased levels of oxidative stress pre-exist in individuals with co-morbidities such as obesity, diabetes and cardiovascular disease, and may play a role in increasing the risk of severe COVID-19.

Antioxidants decrease oxidative stress. They are present in the form of Endogenous antioxidants as glutathione, Vitamin A, C, and E. Dietary antioxidants of enzymatic co factors are selenium and zinc. Nutritional supplements are fruits, vegetables, green tea, olive oil etc.

Epidemiological studies and in vitro evidence suggest that levels of endogenous antioxidants and increased consumption of dietary antioxidants may decrease inflammation and oxidative stress, particularly in patients with co morbid conditions.⁶

Vitamin C

Vitamin C has a number of activities that contributes to its immune-modulating effects. It is a highly effective antioxidant, because of its ability to readily donate electrons, It helps protect important biomolecules (proteins, lipids, carbohydrates, and nucleic acids) from damage by oxidants produced during normal cell metabolism and during exposure to toxins and pollutants (e.g., cigarette smoke).

Vitamin C stimulates neutrophil migration to the site of infection, enhances phagocytosis and oxidant generation, and microbial killing. It protects host tissue from excessive damage by increasing neutrophil apoptosis and clearance by macrophages, and decreasing neutrophil necrosis. Thus, vitamin C is necessary for the immune system to provide adequate response against pathogens, while reducing excessive damage to the host.⁷

Vitamin A

It is essential in maintaining epithelial tissue integrity, when they are severely damaged in viral infections such as measles. Vitamin A is recommended mainly to reduce mortality and risk of complications from pneumonia, and ocular problems.. This can be done by correcting the low or depleted retinol levels that usually occurs in measles infection. Serious COVID-19 caused by SARS-CoV-2 infection has some similar manifestations to measles with symptoms of e fever, cough and pneumonia.

The reason for using anti-inflammatory or antioxidant nutrients in COVID-19 patients in this trial is to modulate the cytokine storm associated with the disease on the lungs.⁸

Vitamin E

Vitamin E is the overall term for four tocopherols (α -, β -, γ -, and δ -tocopherols) and four tocotrienols (α -, β -, γ -, and δ -tocotrienols) found in food. All these forms have antioxidant activities, but they cannot be interconverted, The. α -tocopherol form of vitamin E can only meet the human vitamin E requirement .

Dietary interventions of vitamin E has proved to enhance cell-mediated and humoral immune responses in various species of animals. Many of the following improvements as increased lymphocyte proliferation, immunoglobulin levels, antibody responses, natural killer (NK) cell activity, and interleukin (IL)-2 production have been reported with vitamin E supplementation.⁹

Vitamin D

Vitamin D can reduce risk of infections by inducing cathelicidins and defensins that can lower viral replication rates and reduces concentrations of pro-inflammatory cytokines that produce the inflammation. They may injure the lining of the lungs, leading to pneumonia, and increase the concentrations of anti-inflammatory cytokines.¹⁰

Zincisthesecond-most abundant trace metal in the human body after iron, and an essential component of protein structure and function. Importantly, zinc is a structural constituent of ~750 zinc-finger transcription factors enabling gene transcription, and is a catalytic component of approximately 2000 enzymes, comprising of 6 classes (hydrolase, transferase, oxido-reductase, ligase, lyase, and isomerase). Hence, zinc is biologically essential for cellular processes, including growth and development, zinc is important in DNA synthesis and RNA transcription. Aged individuals are also significantly more susceptible to zinc deficiency, increasing their likelihood of acquiring life-threatening viral infections.¹¹

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Insight into Origin of COVID-19 and Focus on New Opportunities in the New Normal Life

Kuheli Biswas Das¹, Nikita Sharma², Mamata Mishra³

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Abstract

Corona virus disease 19 (COVID19) fetched unprecedented times for all of us. Being pandemic, COVID19 affected 223 countries and territories across the world. In various possible ways we are trying to accommodate with the situation for the best safety & care. During these tough times, as a part of our on-going efforts, we are trying to understand the corona virus, its detection techniques, patho-physiology and fast transmission. In addition, various possible preventive measures and treatment strategies came out. At the same time certain new insights appears due to this COVID19 pandemic, which are new normal due to COVID19. This review will give a glance about the origin and new insights of this pandemic.

Key words: COVID19; SARS CoV2; New Normal of COVID19.

Introduction

The outbreak of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), a highly infective pathogen responsible for the infectious Coronavirus Disease 2019 (COVID-19), has sought global attention about the invisible threat from an old viral enemy¹, SARS-CoV-2 is the third major outbreak of a zoonotic coronavirus [apart from the earlier outbreaks of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and Severe Acute Respiratory Syndrome Coronavirus (SARS-

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Corresponding Author: Mamata Mishra, Senior Research Scientist, Department Research and Devlopment JRF Global, Valsad, Gujarat 396105, India. **E-mail:**mmnbrc@yahoo.com,mamata.mishra@ jrfonline.com CoV)] over the last 20 years, that has infected human populations.^{2,3} COVID-19 has taken the entire globe by a deadly viral storm, that has affected 223 countries and infecting over 144, 358, 956people that claimed more than 3,066,113 lives across the world.⁴ The deadly disease has crippled the world, thereby forcing countries into lockdown, imposing curfews, massive airport screenings, quarantines, and social distancing that has become the norm and way of life across the globe.⁵ The pandemic has evoked fears, apprehensions and concerns amongst citizens, with authorities imposing international and domestic travel restrictions, and putting halt to commerce and trade across nations. The existence of such a deadly virus was first brought to the notice of the world when China informed the World Health Organization (WHO) on December 31, 2019, of a cluster of pneumonia like cases of an unknown source in Wuhan City in Hubei province, the epicentre of the disease.^{5,6} The WHO later on January 9, 2020 issued a statement saying Chinese researchers have made "preliminary determination" of the virus as a novel coronavirus.⁵ On January 30, 2020, an expert panel from WHO declared SARS-CoV-2 outbreak as a Public Health

Emergency of International Concern (PHEIC), and on March 11, 2020, the outbreak was declared as a pandemic by WHO.^{2,6}

Is SARS-CoV-2 Man Made

Since the outbreak of COVID-19, speculations has been arising as to whether the deadly SARS-CoV-2 is a man-made virus or has natural origins? While the global communities have reacted strongly against China for their lack of transparency since the outbreak happened in Wuhan, conspiracy theories about the origin of SARS-CoV-2 have been brewing across various sections in the social media. One of the most prominent theories published in the fact-checking website 'Snopes' alleged that the new coronavirus was created as a bio-weapon in a government lab which however leaked onto the people of that region.⁷ However, this theory was disputed by several researchers as being illogical and baseless as it lacked concrete evidence. French virologist and medicine Nobel laureate Luc Montagnier, while interviewing on a French news channel, claimed that SARS-CoV-2 is a man-made virus which was the result of an endeavour to design a vaccine for combating the deadly AIDS virus, in a laboratory located in the city of Wuhan[8].In his interview, Montagnier further alleged that there are presence of elements of HIV-1 retrovirusand malaria germ-the parasite Plasmodium falciparum, which can be easily detected in the genome of coronavirus, that authenticates it's unnatural origin.8 Professor Chumakov, from the Engelhardt Institute of Molecular Biology in Moscow, however claimed that scientists at the Wuhan Laboratory had been actively involved for more than 10 years, with the development of various coronavirus forms or variants in order to study their pathogenicity, and not with the aim to create any pathogenic variants.9

As the COVID-19 crisis continue to rise across nations, debates about China's involvement is also being speculated. It is very clear that some Chinese officials made a major mistake between the late December of 2019 and early January of 2020, by concealing the coronavirus outbreak in Wuhan, and silencing doctors, healthcare workers who tried to report the same.¹⁰ A report even claimed that, a doctor named Li Wenliang and few other doctors who tried to warn about a SARS-like virus outbreak, were silenced by Chinese authorities, and later Dr. Li died from COVID-19 related complications.¹¹ In fact, internal documents received by 'The Epoch Times' confirm that Beijing covered up the outbreak of the virus, and central authorities were secretly providing directives to regional governments on how to cope with the outbreak.12 Michael Gove,

Senior British government minister too believed that some of the reporting from China about the scale, the nature, and the infectiousness of the virus, lacked clarity.13 As COVID-19 cases began to surpass across the globe during mid-March, with many European countries going into lockdown in response to the threat, Wuhan shut its last temporary Coronavirus hospital as no new cases of the disease were reported in the city.¹⁴ However, in the following days, several indicators pointed that Government of China and Chinese state media may have deliberately understated the number of COVID-19-related deaths in its soil.14 Several pieces of evidence from investigative journalists and citizens of China, have shed light on the lack of transparency of the Chinese authorities even in the number of funeral urns in Wuhan, which seems to exceed the number of official deaths standing at 3,500, indicating that the number of deaths in Wuhan could be as higher than 40,000.¹⁴ A recent report published in 'Guardian' claimed that China is even trying to inspect onto the publications of research articles relating to the origins of the novel coronavirus, and this clearly indicates China's effort in attempting to control all narrations and information relating to the pandemic.¹⁵ In fact, research articles related to the novel coronavirus which were published earlier in the websites of two leading Universities of China, were removed, suggesting China's new policy that require academic research papers, particularly those pinpointing the origin of the coronavirus, to seek government approval before publication.¹⁵ Despite deliberate attempt of the Chinese government to restrict information related to the coronavirus outbreak, suspicion is only growing as COVID-19 related death continue to rise across the globe.

SARS-CoV-2 has Natural Origin

Amongst all these reports of conspiracy and speculations, various scientists from different nations have strongly refuted such claims of the virus being 'man-made' by providing scientific evidence about SARS-CoV-2's natural origin. Immunologist Nigel McMillan from the Menzies Health Institute Queensland also mentioned that evidence suggests that the SARS-CoV-2 is naturally derived and not a result of intentional manipulation.¹⁶ Furthermore, WHO spokeswoman FadelaChaib, while briefing the media in Geneva, confirmed that the virus is of animal origin and not a product of laboratory manipulation.¹⁷ However, it is important to note that viruses can mutate naturally anywhere; in animal hosts, in humans, or even in laboratory cell cultures, and it's difficult to determine where and

how the new coronavirus acquired its mutations, and most researchers believed that the process involved an animal host.^{16,18} With the genomic analyses of SARS-CoV-2, and its subsequent publications in scientific journals, scientists across the globe have confirmed that this coronavirus originated in wildlife. Researchers led by Shan-Lu Liu at the Ohio State University further confirmed that there is no evidence of genetic engineering as the virus's genome was already sequenced, and in case of1 any alteration in the genome sequence, signs of inserted gene sequences would have been clearly visible.¹⁹

In a new analysis of SARS-CoV-2 by a group of researchers, the genome of this novel coronavirus was compared with seven other coronaviruses known to infect humans, viz., SARS, MERS and SARS-CoV-2 (causing severe diseases) and, HKU1, NL63, OC43 and 229E (showing milder symptoms).^{20,21} These group researchers confirmed in their published article in the Journal of Nature Medicine, that SARS-CoV-2 is not a product of the laboratory or a deliberately manipulated virus.^{20,21} The genomic data of the novel coronavirus show that its spike protein contains some unique adaptations that gives it a special ability to bind to a specific protein called angiotensin converting enzyme (ACE2) on the human cells. It should be noted that all coronaviruses infect other cells through its spike proteins.

The researchers to their surprise, found that the spike protein bound much better only because of natural selection on ACE2 which enabled the virus to take advantage of a previously unidentified alternate binding site, thereby providing further strong evidence that that new virus was not the product of a laboratory manipulation.²² The researchers believed that any amount of bioengineering aiming to design a coronavirus that jeopardizedhuman health, would probably never choose this particularconformation for a spike protein.²² Further, analysis of the genomic data of SARS-CoV-2 by researchers also revealed that the backbone of SARS-CoV-2 closely resembles that of a bat coronavirus discovered only after the COVID-19 pandemic began; however, the region that binds ACE2 resembles a novel virus in pangolins, thereby providing additional evidence that SARS-CoV-2 certainly originated in nature.

If the new coronavirus was a laboratory construct, then scientists would have used the backbones of coronaviruses already known to cause severe health hazards in humans.²² The researchers in their study, believes that the carrier of the virus is a bat, which transmitted the virus to another intermediate animal (possibly a pangolin), and that later got transmitted to humans in a pathogenic form.²¹ In an online statement published in The Lancet, 27 public health scientists from around the world supported the efforts of the scientists, public health professionals, and medical professionals of China in combatting the pandemic.²³ The statement was further supported by a letter from the presidents of the US National Academies of Science, Engineering, and Medicine and by the scientific communities they represent. They stressed upon that conspiracy theories create fear, panic, confusions, and prejudice that threaten global collaboration and efforts in the fight against the virus.²³

These public health scientists in their statement also voiced support for the call of the Director-General of WHO "to promote scientific evidence and unity over misinformation and conjecture.²³ Although evidence so far point to the fact SARS-CoV-2 is naturally derived, refuting it of being human-made, still discussions around this subject have become increasingly important as US government intelligence officials are reportedly still investigating the potential source of the pandemic. In fact, Director-General of WHO, Tedros Adhanom Ghebreyesus speaking at the World Health Assembly through a virtual conference assured that he will initiate an independent evaluation at the earliest appropriate moment to review experience gained and lessons learned, to improve national and global pandemic preparedness and response.²⁴ In his speech Tedros also called upon nations to resolve and do everything it takes to ensure that the coronavirus pandemic is never repeated in future.

A New Normal during COVID19

In an outbreak like COVID19, the disease spreads more quickly and infectslargenumber of people than predicted. In these hard times, nations are evolving and both citizens and government should actively be a part of progress emphasizing on AATMANIRBHARTA (self-reliance) therefore, opening up gates towards new horizons.²⁴ This pandemic has given wheels and momentum to cope up with the crisis situation. We will look into the positive sides of the lockdown and the COVID-19 from two sides. The first side will be on a personal prospect and the second will be on nation i.e. INDIA's prospect. On a personal account, this started with a stage of fear for the disease and lockdown. This gets to the next step as the stage of learning where people decreased exposure to fake news and grew emotionally strong. This stage evolved to the stage of growth. The people are

now more genuine in their relationships. They are practicing more hygienic practices and are more aware of cleanliness. They are looking into the old relationships and connecting back to their old friends, distant relatives, and far away connections. The finances have shifted to blue-chips and these are considered as a safe bet to invest. Remote working is now mainstream. The affordable real estate and luxurious housing is a bigger emphasis. The longtime of everyone staying apart and having no bigger time to stay together is now converted to a nice time for the families to stay together and have a healthy time.

The population that spends on street food is now cooking food at home and is learning this new skill. This is a time to go back on to the long left hobbies and pending works. This has given a break and pause in the mid of the hustle-bustle of life. People are grateful for understanding the value of life and being alive. There is an increase in online leanings, courses, and classes. This has given us the opportunity to learn new things. Everyone got time for themselves, their self- introspection, further planning and more clear understanding of themselves.

The lockdown has established a bond between all the citizens of the country. The real heroes as Corona Worriers are now the frontline fighters with all their will. Their work made everyone else stay safe and sound. The government on one side ensured the public health and on another hand the infected patient's wellbeing. The human race has started to live life with limited resources and stopped being materialistic. For better health, yoga and exercise are in big consideration. Humans of all ages are going towards technological advancement acceptance and are learning them. This has given patience. It has given positivity to the views. There is huge respect in society for healthcare professionals, workers, police service providers, volunteers, and all service providers.

This time has given lifelong moments and memories to everyone in one or another way. The pandemic made us realized that there exists a social responsibility of each individual towards every other citizen. We are now emotionally strong. We all are very vigilant about our life. This pandemic has given an insight into uncertainties of life where we earned the capabilities as an individual, as a family, as a citizen. The long wait of coming out of the situation has made the entire human race believe that we are unstoppable in the sense that life will go on with new acceptances and evolving working styles as per the situations and conditions. The second prospect is the growth and new additions in the different sectors and ways of the country with the new normal challenges. It has opened up mind channels as well gave an insight towards future policy making and strategy building. The India is looking ahead towards a bigger picture. The nation is heading to a better version of its own self with a jump start seeing the current pandemic situation. Where there is a downfall in the country, a new rise is there on the same way. This has pushed the growth suddenly at a five years forward platform. We are now heading towards the base strengthening to the technical advancements.

Environment

The environment is the biggest positive thing the human kind has come across because of shutting down of the industries and no road traffic. The sky is clearer than previous days. The emission of different gases that were polluting has significantly decreased with the decreased to no factory and industry pollutions. The holes in the ozone layer are healing and the gases level in the environment is decreasing.

Real Estate

The real estate has always been a choice for investments and consideration. In the light of COVID, we will look in terms of Commercial offices and Residential sector. In commercial offices, the demand for a big flexible space is now the new consideration. As per social distancing, new layouts are to be made. For business continuity, decentralization will be taken in account. So, here the offices as well as housings are going to be the new workplace for the employees. An advancement in the technology demands more amenities in both of them. The human race is towards a luxuries house and a comfortable workplace which will increase in the demands of shares in real estate. On looking into residential sector, the township is going to see a rise in demand. The digital solutions including developers performed well in the lockdown. There is a rise in the need for larger and flexible homes with the ability of converting home to workplace. The reverse migration may create bigger demand in the housing at the Tier II and III cities.²⁵ The pandemic has given a vision to look for better and advanced housing investments. The real estate is now growing and is having a more affordable investing. Digitalisation has improved the market working. It has made the documentation and dealing comparatively more faithful and adaptability at stretch.

Information and Communication Sector

The telecommunication industries are a part within information and communication sector. It has telecommunication companies and internet service providers into it. During the lockdown, this particular industry has played even more crucial roles. The work from home demanded for a more promising network. So, the network stability is ensured. The new concepts of online consultation and telemedicine, gave the sector new platform and more subscribers to come in as new customers. This gave a connection to the vital services. The outreaching has increased for the government and they came up with different tracking systems for COVID-19 patients that are based on internet connectivity and availability. This helped in creating awareness in terms of the Do's and Don'ts of the pandemic.

There are different companies that have come up with more customer oriented services. This has made it more reliable and functional for coming days. The present situation has led to more of an online world, virtual interactions and distance learning. This made the growth jump to a five plus year directly in terms of technology usage and learning.

Manufacturing

The manufacturing sector is looking to heights at the local markets. The manufacturing is looking into "Vocal for Local", where the India is preferring the whole set up to be made in the Nation's market. The government is also supporting the micro, Small and medium businesses to come up with new ideas and start new businesses. The most advantageous part of establishing manufacturing units are the increased employment and exposure to new technologies. The India is now more ready for accommodating other nations for investing and giving it a chance for their settling up. This situation has made us look more into the strengths, possibilities and positivity of the sector. It has increased the focus towards "Made in India" products. This is promoting the local businesses and local market. We are now ready to provide a market for other nations and a better approach to personal growth. The India is establishing its own platform for the release and intake. The in nation manufacturing will directly add up to the finances. The exports will increase with a promising increase in the value of rupee. This newer vision is to scale up in house workforce, getting validated to international standards, involve greater scale development, and settling up an innovation network with other nations. The

focus is now on availability of raw materials and its assembly. The innovation and creativity may take up an outstanding modernisation appraisal.

Health Sector & Pharmaceutical Industry

The Healthcare sector was the most active sector during whole COVID-19 pandemic. The warriors of the time gave this sector recognition and made everyone understand its importance. Today we all are aware of how much the healthcare is important. In these hard times, the real heroes of all times have come up with lifesaving services. The hospitals are actively taking up the new normal to its routine practices. India is focusing on increasing the investment towards the healthcare sector. The hospitals are coming up with the online consultation platforms, dedicated isolation wards, special care to the COVID patients and to the other patients on separate dedicated wards and areas. There are new trainings in the hospitals to the staff and all workers. The hospitals have come up with more hygienic practices ensuring at patient's end as well. The healthcare as a whole is now looking towards research as a main part of them. The newer policies and plans are made for the pandemics. The healthcare sector is preparing to a better ready for the future pandemics.

On the other hand, the pharmaceuticals are looking towards the drug and vaccine. The above is an example of Serum Company. The companies are extending the boundaries; they are stretching towards vaccine of COVID. The industry is now ready to take up the newer technologies, setting up collaborations and work. India is putting an eye to the alternative medicines which have come up to be more reliable in prevention measures taken. The drug manufacturing remained in the pipeline with increased demand to specific drugs. The companies like Bharat Biotech, Zydus Cadila, Serum Institute of India, etc. are all working hard and ensuring the public faith to remain.²⁶

Governance

The government is using tracking system for monitoring the location of people who are in isolation.

This is a launch in favour of the public which carries data from all the citizens. It acts as a bodyguard that alarms for awareness when some COVID positive persons is present in certain circumference. Also, it allows a self-assessment. It updates with the cases and all the data. The government has launched a website "MyGov" that updates on all the government policies and schemes. The website is also available as an application. The government has given a big emphasis on the hospitals in these times. There are new diagnostic labs settled in these times. There are beds with ventilators in the hospitals. The PM care funds have come up as the biggest help to the nation. The government has come up for an appeal for AATMANIRBHAR BHARAT. It has come up as a campaign.

Conclusion

Being pandemic, COVID19 affects 210 countries and territories across the world. In various possible ways we are trying to accommodate with the situation for the best safety & care. During these tough times, as a part of our on-going efforts, we would like to better understand the corona virus, its detection techniques, pathophysiology and fast transmission. The need of the hour is cooperative and coordinated efforts of national leaders from across the globe, along with researchers, pharmaceutical companies and healthcare systems worldwide, which would help not only in predicting the future of this pandemic, but also in controlling the present outbreak.

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Role of Nutrition in Immunity

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Abstract

A balanced diet combined with healthy lifestyle factors like adequate sleep ,low stress and exercise primes the body to fight infection and disease. Good nutrition supports the body throughout the life phases. The development of human body immune system is determined by the nutritional status. Nutrients are involved with the normal functioning of the immune system. Vitamin C, Vitamin D, Zinc, Selenium, Iron, and Protein have been identified as critical nutrients for the growth and function of immune cells.Deficit intake of one or more nutrients results in altered immune responses. This article highlights the importance of nutritional requirements to enhance the immune response.

Key Words: Nutrition; Balanced diet; Infection; Immune system.

Introduction

Adequate intake of macronutrients and micronutrient is vital to ensure a good supply of nutrients required for the development, maintenance and expression of the immune response.¹ Eating Pattern and habits decides body's capability to prevent, fight and recover from infections. Over nutrition and under nutrition may alter immune responses. Micronutrients such as zinc, selenium iron copper vitamins A, B-6, C, E, and folic acid have important influences on immune responses.² The development, maintenance and optimal functioning of immune cells is important to fight against infection at all stages of recovery. Even though in industrialized countries, the availability of healthy and nutritious food is feasible, factors such as social, economic, educational, ethnic and cultural backgrounds influence the diet pattern of

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individuals which in turn has an adverse effect on their micronutrient status.³ Henceforth, Nutrition is a precarious determinant of immune response and is the most common cause of immune deficiency worldwide.

Nutritional Status the present scenario in India

According to the Global Nutrition Report 2020, India is alsoamong the 88 countries that are likely to miss global nutrition targets by 2025. It indicates that rate of overweight and obesity continueto be rising, affecting almost a fifth of the adults, at 21.6% of women and 17.8% of men. Anemia is also highly prevalent in the country with one in two among women of reproductive age. 'The State of Food Security and Nutrition in the World, 2020'report states that 14 per cent of India's population are undernourished which accounts for 189.2 million people and 34.7 per cent of the children under five yearsare stunted. It further highlights that 20 per cent of children under the age of 5 suffer from wasting (meaning their weight is too low for their height) in India. The pandemic crisis has further worsened the nutritional status of the country among under-privileged population. The impact of poor nutritional status during infections among individuals is mediated by the effect of nutritional deficiencies on the immune defense mechanism.

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Relationship between Nutrition, Infection and Immune Response

Malnutrition makes a person more susceptible to infection, and chronic infection in turn contributes to malnutrition as a vicious cycle (Fig.1) depicts the relationship between malnutrition and infection.



Fig. 1: Cycle depicting the relationship between Malnutrition and Infection.

Source: Malnutrition and Gastrointestinal and Respiratory Infections in Children: A Public Health Problem, 2011.

During infection, the immune response demands high energy expenditure. The infected individual will be subjected to diarrhoea, mal-absorption and loss of appetite which alters their nutrient intake thereby affecting the nutritional status.⁵ The altered nutritional status adversely affects the defense mechanism through hyper-metabolism, negativenitrogen balance, increased gluco-neo-genesis and increased fat oxidation, which is modulated by hormones, cytokines and other pro-inflammatory mediators. An inadequate intake of nutrients leadto increasedcatabolism , weight loss, , mucosal damage, invasion by pathogens, decreased immunity and impaired growth and development.

Importance of Micronutrient requirements in each stage of life

In every stage of human life immune response depends on adequate nutrition reserve in the body.⁶ Starting from infants, the breast milk provides various immunological components such as antibodies (e.g., antigen-specific IgA), antiinflammatory cytokines, anti-microbial factors and critical micronutrients necessary to support neonatal development of immune system.⁷ Breastfed babies are less proneto infections and hospitalizations than formula-fed infants. Worldwide child hood micronutrient deficiencies includes Iron, Vitamin A,Iodine and Zinc deficiencyare common.⁸ Young children have more crave forprocessed foodsthan

fruits and green leafy vegetables whichlead to poor micronutrient status. Need of essential micronutrients proliferates during adolescents and adult stage. It is essential to ensure that antioxidant levels (e.g., vitamins A, E, and C) and micronutrients that are components of antioxidant enzymes (e.g., zinc, copper, iron, and selenium) are sufficient in the dietary habits of adolescents and adults to combat the oxidative stress, which isinduced by unhealthy lifestyle factors.9 The oxidative stress also impairs the immune system. Micronutrient deficiencies are also common among elderly people. Aging process makes the internal organs less efficient and immune-related organs like thymus or bone marrow produce less immune cells needed to fight off infections.Micronutrients such as Vitamins A, D, C, B2, and B12, Folic acid, Iron, Zinc and Selenium have immune modulatory and antioxidant property that influence the host to fight against infections.¹⁰Adequate dietintake is important in each stage of life to ensure good immune system.

Nutritional requirements during Infection

Magnitude of infection recovery depends on the nutritional reserve of the individual. The nature and duration of the infection and the diet of the individual during the infection also imparts the recovery speed of the infected individual.

Carbohydrates: Energy and carbohydrate requirements during fever increases due to increased metabolic rate. The energy intake needs an increase by almost 50% depending on the severity of infection. Simple and easilydigestible carbohydrates like rice, steamed foods, simple porridges, fruit juices, and nutritional supplements are recommended.

Protein: Protein helps in repair and replacement of tissues. Metabolic damage such as losing proteins during the infection increases the need for dietary protein. A high protein diet supplying about 1.25-1.5g protein per kg of body weight per day should be given to patients to recover from infections. Good quality protein can be obtained from fish, poultry, lean red meat, eggs, dairy products, nuts, dried beans, peas, lentils, and soy. Protein supplements may also help to meet the increased demand of proteins by the body during infection

Vitamins and Minerals: Micronutrient requirements are increased during infections. Eating a variety of fruits and vegetables helps to meet the increased demands for immune response during infection. Vitamins like A, E and C are antioxidants that fights infection causing agents and to promote

faster recovery with quicker tissue regeneration. B-complex vitamins, especially vitamin B9 (folic acid), should be consumed in larger amounts. Zinc has antimicrobial and antibacterial properties which supports the immune system. Sodium and potassium loss due to electrolyte imbalance should be replaced by including more fluids such as soups, juices, and milk.¹¹

Important dietary sources of nutrients that support the immune system

World Health Organisation guidance on diet, especially during the current pandemic states that "good nutrition is crucial for health" (WHO, 2020). Providing a diet rich in vitamins and minerals (Table 1) supports optimal function of the immune system by providing antioxidants to slow damage of cells caused by free radicals.

Nutrient	Good dietary sources
Vitamin A	Milk and cheese, eggs, liver, oily fish, fortified cereals, dark orange foods-carrot, pumpkin, mango, papaya, peaches, green leafy vegetables such as spinach, broccoli
Vitamin B6	Fish, poultry, meat, eggs, whole grain cereals, fortified cereals, soya beans, green vegetables ,green leafy vegetables and fruits such as bananas,
Vitamin B12	Fish, meat, shellfish, milk and cheese, eggs, fortified breakfast cereals,
Folate	Broccoli, green leafy vegetables such as spinach, kale, cabbage, peas, chick peas, kidney beans, fortified cereals
Vitamin C	Citrus fruits such as oranges and lemon, amla, guava, tomato, strawberries, blackcurrants, kiwi, broccoli,
Vitamin D	Oily fish, liver, eggs, fortified foods (spreads and some breakfast cereals)
Vitamin E	Nuts and seeds- Almonds, pea nuts, vegetable oils,
Zinc	Shellfish, crab, lean meat and poultry, cheese, chick peas, beans, yogurt.
Iron	Meat, liver, beans, nuts, dried fruit (eg, apricots), whole-grains (eg, brown rice), egg, fortified cereals, most dark green leafy vegetables (spinach, kale)
Copper	Shellfish, nuts, liver, some vegetables
Selenium	Fish, sea-foods, meat liver poultry cheese eggs, some nuts especially brazil nuts

Conclusion

The nature of infectious agentsvaries and so different dietary approaches are required to

support the immune system. Each nutrient has a diverse role in functioning of the immune system. Balanced nutritioncan create an environment for the immune system to respond appropriately to overcomethe challenges of infection thereby brings out quick recovery of the infected individual.

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Nutrimental and Ethnomedicinal Potential Plants of the Qur'an: An overview -VI

TP Mall

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Abstract

Our ancient literatures of Hindus', Muslims as well as of Cristian's are full of plants described about their nutrimental and medicinal potential. A significant number of plants described in their texts are still unidentified because of least or no interest in plant taxonomy among neither grate scientists in well-developed different organisations nor respected teachers of Universities or Colleges of repute. We can say with confidence that there are no teachers who can teach Plant Taxonomy in significant numbers of academic institutions. A man of Biotechnology can do nothing if he/she cannot identify the plant on which the work has to be worked out. As a result, due to non-identification of plants we cannot use our wealth of knowledge which has been provided by our ancestors present in form of scripts.

We were presented a book written by Dr. M. I. H. Farooqi entitled "QuruaniPoudhe-VagayanicDhristi Se" while in Seminar organised by UP Biodiversity Board, Lucknow. We found that there are seventy-one plants being reported in Holy Qur'an and Bible. We have consulted the literatures available as well as the tribal of Bahraich about the uses of the plants available. The perusal of the alphabetical list of plants of Holy Qur'an reveals that there are 71 plant species representing 48 genera of 30 families. Brassicaceae, Cucurbitaceae and Moraceae family were found to be the biggest family represented by 6 plant species each whereas Caesalpiniaceae, Papilionoideae and Poaceae with 5 plant species each; Rosaceae and Rhamnaceae with 4 plant apecies; Mimosaceae, Liliaceae, Pinaceae, Euphorbiaceae, Oleaceae, Lytharaceae, Lamiaceae and Arecaceae with 2 plant species and rest fourteen species viz., Malvaceae, Asclepidiaceae, Sterculiaceae, Ericaceae, Salvadoraceae, and Vitaceae is being represented by single plant species each.

Key words: Ethnobotanical; Ethnomedicinal; Potential; Plants; Qur'an.

Introduction

Herbal Medicine is the oldest form of medicine known to mankind. It was the mainstay of many early civilizations and still the most widely practiced form of medicine in the world today,

Ethnobotany is one of the most interesting themes of economic botany which might have first of all came into the existence probably when earliest man of "stone age" observed the animals mostly

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the apes and monkeys eating certain plants or plant parts ex. Fruits, leaves and even inflorescences to satisfy their hunger. Therefore, on the basis of plants usage first of all by animals and later on by the human beings the concepts of Ethnobotany and Ethnozoology were evolved, which merged into a common term known as Ethnobiology. However, the term Ethnobotany was first of all used in the last of 19th century by J. W. Harsh Berger (1895) to indicate the interrelationship of plants with aboriginal people or tribal societies [Trivedi and Sharma, 2011]. In many parts of the world, wild plants are obtained from forests or wild areas designated for extractive resources and managed by local communities [Jadhav et al., 2011]. Wild edible plants provide food quantity as well as medicines [Patale et al., 2015].

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India is one of the twelve mega-biodiversity countries of the World having rich vegetation with a wide variety of plants. As per the 2001 census, the tribal population of India is 8.43 crore, constituting 8.2% of total population of the country [Annual Report, 2005-2006]. With enormously diversified ethnic groups and rich biological resources, India represents one of the great emporia of ethnobotanical wealth [Pal, 2000]. Even today, trial's and certain local communities in India still collecting and preserving locally available wild and cultivated plant species for their day today life [Mahishi et al., 2005 and Ayyanar et al., 2010].

We were presented a book written by Dr. M.I.H. Farooqi entitled "QuruaniPoudhe-VagayanicDhristi Se" while in Seminar organised by UP Biodiversity Board, Lucknow. We found that there are seventy-one plants being reported in Holy Qur'an and Bible. We have consulted the literatures available as well as the tribal of Bahraich about the uses of the plants available. The perusal of the alphabetical list of plants of Holy Qur'an reveals that there are 71 plant species representing 48 genera of 30 families.

Brassicaceae, Cucurbitaceae and Moraceae family were found to be the biggest family represented by 6 plant species each whereas Caesalpiniaceae, Papilionoideae and Poaceae with 5 plant species each; Rosaceae and Rhamnaceae with 4 plant apecies; Mimosaceae, Liliaceae, Pinaceae, Euphorbiaceae, Oleaceae, Lytharaceae, Lamiaceae and Arecaceae with 2 plant species and rest fourteen species viz., Malvaceae, Asclepidiaceae, Bixaceae, Dipterocarpaceae, Lauraceae, Juglandaceae, Cuprassaceae, Lecnoraceae, Anacardiaceae, Loranthaceae, Sterculiaceae, Ericaceae, Salvadoraceae, and Vitaceae is being represented by single plant species each. We have enumerated five plants viz., Acacia nilotica, Acacia senegal, Acacia seyal, Alhgimaurorum and Allium cepa in first part and eight plants viz., Allium sativum, Astragaluhadscendens, Bombax ceiba, Brassica arabica, Brassica juncea, Brassica nigra, Brassica rapa and Brassica schimperi in second part, in third part seven plants viz., Butea monosperma, Calotropisgigantean, Cedruslibani, Cedrusdeodara, Ceratonia siliqua, Cinnamomumcamphora and Citrullus colocunthis, in the fourth part eight plants viz., Cochlospermumreligiosum, Cucumis melo, Cucumis utilisimus, Cucurbita pepo, vulgaris, Dryobalamopsaromaticum, Cydonia resiniferaandFicusbenghalensis. Euphorbia and in fifth part nine plants viz., Ficuscarica, Ficuselastica, Ficus racemose, Ficus religiose,

Ficusrumphi, Fraxinus ornus, Hordeum vulgare, Juglans regia, Juniperusoxycedrus. In the present sixth part we are enumerating fourteen Lagenariasiceraria, plants viz., Lagenaria vulgaris, Lawsoniainermis, Lacanoraaffinis, Lensculinars, Lens esculenta, Loranthus acacia, Ocimumbasilicum, Ocimum sanctum,Olea europaea, Panicum miliaceum, Phoenix dactylifera, Phoenix Sylvestris and Pistacia vera. The present review is an attempt to compile most of the information available regarding the distribution, cultivation. phytochemical characteristics, Ayurvedic properties, ethno-pharmacological, medicinal and non-medicinal uses of the plants.

Enumerations

Lagenariasiceraria (Molina) Standl.Bottle Gourd, Lauki, Calabash plant (Cucurbitaceae):

Synonyms

Lagenaria vulgaris

The plant, Lagenariasiceraria is acommon fruit vegetable used throughout the India. Lagenariasiceraria is an annual climber growing to 9 m at a fast rate. It is hardy to zone (UK) 10 and is frost tender. It is in flower from August to September. The species is monoecious (individual flowers are either male or female, but both sexes can be found on the same plant) and is pollinated by Insects.

Lagenariasiceraria is 7.9-15.5 cm long, ellipticalshaped having entire margin and parallelvenation. The apex of the plant is acute havingleathery surface with firm texture, dark greencolour, bitter taste and characteristic odour.

Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil. Suitable pH: acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It prefers moist soil.

The transverse section of Lagenariasiceraria leafshowed upper epidermis consists of elongatedparenchymatous cells, covered by cuticle. Theupper epidermis shows few stomata, which are ofamniocytic type. Lower epidermis containselongated wavy walled parenchymatous cellscovered by cuticle. Number of Covering and collapsed trichomes are present, while very fewglandular trichomes are also present. Palisadecells are present at upper and lower epidermis.Mesophyll is made up of 3-4 layered chloroplastscontaining, compactly arranged, oval to circularcells. It is interrupted by vascular bundles ofvarious sizes. Vascular bundles are surrounded by2-3 layered sclerenchyma; they are conjoint,collateral and closed. Xylem is placed towardsupper epidermis and phloem towards lowerepidermis[Shah and Seth, 2010].

Phytochemicals

Alkaloids, phenols, tannins, flavonoids and steroidal compounds are known in the genus.

The phytochemical analysis ofedible portion of the fruit it is shown that it is agood source Glucose and fructose. The aminoacid composition of the fruit is as leucine's; phenylalanine; valine;tyrosine; alanine; threonine; glutamicacid; serine; aspartic acid; cystine;cysteine; arginine; and proline.

The fruit is a good source of vitamins B and a fairsource of ascorbic acid. Bitter fruits yield 0.013% of solid foam containing cucurbitacin's B, D, Gand H, mainly cucurbitacin B. These bitterprinciples are present in the fruit as aglycones.

Leaves cucurbitacin contain В and roots,cucurbitacin's B, D and E [The Wealth of India, 2004]. Phytochemicalscreening of the fruit revealed two steroids wereisolated from the petroleum ether fraction andthey were identified as fecosterol and camp sterol[Shirwaikar and Sreenivasan, 1996]. Sugar and phenolic content of thefresh product was assayed, providing partialnutritional characterisation of this а vegetable.Glucose and fructose and traces of sucrose werefound; in addition, a small amount of unidentifiedmono- and dicaffeoylquinic acid derivatives wasdetected[Calabrese, 2000].

HPLC analysis of extract offlowering plant of Lagenariasiceraria showspresence of flavone-C glycoside[Baranowska and Cisowski, 1994]. A water-soluble polysaccharide, isolated from fruitingbodies of Lagenariasiceraria, is composed ofmethyl- α -d-galacturonate, 3-O-acetyl methyl- α dgalacturonate, and β -d-galactose in a ratio of nearly 1:1:1. This polysaccharide showed cytotoxic activity in-vitro against human breastadenocarcinoma cell line (MCF-7)[Ghose et al., 2009]. It is also reported to have content more proportion of soluble dietary fibres (SDF) than insoluble fibres.

SDF are having profound effect in loweringserum cholesterol, which also reveals that thepectin is predominant component of solublefibres in Lagenariasiceraria fruits [Chang et al., 1995]. Peroxidaseand polyperoxidase activity in relation to itsblanching period and total enzymatic inactivationof blanched sample (i.e., residual peroxidaseactivity is less than one) is also reported in 180 seconds. The seed ofLagenariasiceraria is also a good nutritive agentwhich contains vitamins, minerals, amino acidsalong with saponins and essential fixed oils andthe seed is also used in dropsy and in worminfections[Rahman, 2003; Warrier and Nambiar, 1995]. There are two triterpenoidsisolated from its fruit 22-Deoxocucurbitacin Dand 22-DeoxoisocucurbitacinD[Enslimetal., 1967] and some more compounds which have been isolatedfrom the fruits of Lagenariasiceraria likeoleanolic acid, β -sitosterol, campesterol, isoquercitrin[Gangwalet al., 2010].

Ethnobotanical Potential

Immature fruits are cooked and used as a vegetable [Hedrick, 1972; Vilmorin, 1981; Huxley, 1992]. They can be boiled, steamed, fried, used in curries or made into fritters [Facciola, 1990]. Of variable quality, but some of the selected cultivars from India and China are of very good quality, equivalent to good summer squashes [Facciola, 1990]. The pulp around the seed is purgative and should not be eaten [Uphof, 1959]. The fruit can be dried for later use [Organ, 1963]. Leaves and young shoots - cooked and used as a potherb [Stuart, 1979; Facciola, 1990]. Seed - cooked. Rich in oil, it is added to soups etc [Facciola, 1990]. A vegetable curd, similar to tofu, can be made from the seed [Facciola, 1990]. An edible oil is obtained from the seed. It is used for cooking [Kunkel, 1984; Facciola, 1990]. Yields of up to 45% have been obtained [Chopra et al., 1986].

The tribal communities (Koyas, GuttiKoyas, and Lambadas) located in the northern Telangana zone use the dry hard shells of bottle gourd fruits for various purposes. Bottle gourd is variously referred as sorakaya, anapakaya, anapakaya, burrakaya, and tumri in the vernacular language by the tribal communities.

Domestic utensils like bottles, bowls, milk pots, spoons, and containers of several types are made out of the dried shells. It is a common sight everywhere in the tribal dominated pockets of Khammam district that the ethnic groups are mainly using the dry shells for carrying country liquor (mahua drink, toddy), honey, and water.

In some of the pockets it is being used for making stringed and wind musical instruments and pipes. At few places, the natives use the dried shells as floats on water bodies as well. Though it is nutritionally less calorific, tribal prefer bottle gourd as a vegetable for preparation of curries and pickles [Rood, 1994; Chittendon, 1951; Summit and Widess, 2007].

Ethnomedicinal Potential

Traditional uses of bottle gourd (Lagenariasiceraria) show that the fruits are used as a general tonic, a cardiotonic, and a cardioprotective drug. In addition, it has also been used as an aphrodisiac, a diuretic, an antidote to certain poisons and scorpion stings, and an alternative purgative. Bottle gourd contains rich amounts of carbohydrates, dietary constituents, minerals, vitamins, and amino acids. It is also reported that the bitter principle of Cucurbitaceae such as the triterpenoid cucurbitacin's, B, D, G, H, and 22-deoxycucurbitacin, are also present in the fruit. Pharmacological and toxicological research carried on L. siceraria has confirmed the pharmacotherapeutic potential and safety profile of this wonderful natural herb. The anti-asthmatic and anti-allergic activity of the aqueous extract of leaf of L. siceraria was evaluated in different animal models. It is reported that the triterpene bryonolic acid, an anti-allergic compound, was isolated from callus culture of the roots of L. siceraria [Debjaniet al., 2017].

The fruits, leaves, stem, seeds and oil ofLagenariasicerariaare traditionally used in thetreatment of jaundice, diabetes, ulcer, piles, colitis, insanity, hypertension, congestive cardiacfailure, and skin diseases.

The fruit pulp is used as an emetic, sedative, purgative, cooling, diuretic, ant bilious, and pectoral.

Extracts of the planthave shown antibiotic activity.

Leaf juice is widely used forbaldness[Kirtikar and Basu, 2005; Rahman, 2003; Duke and Ayensu, 1985].

Lagenariasicerariajuice is an excellent remedyfor heart problems, digestive and urinarydisorders, and in diabetes.

Dietary fibre present inLagenariasicerariahelps in constipation, flatulence, and even inpiles.

Topical application of a mixture of Lagenariasicerariajuiceand sesame oil on scalp gives beneficial results inbaldness (hair loss).

The juice also shows bettereffects in the treatment of insomnia, epilepsy, andother nervous diseases, moreover it helps breakup calculus (stones) in the body.

In summer orhot conditions, Lagenariasiceraria juice prevents excessive lossof sodium, satiating thirst, and giving a coolingeffect[Rahman, 2003].

The Koya community uses the fruits of the wild types for medicinal purposes (purgatives). Probably,

the bitterprinciple found in the wild bottle gourds isresponsible for the purgative property. The pulp around the seed is emetic and purgative[Uphof, 1959; Stuart, 1979; Manandhar, 2002].

A poultice of the crushed leaves has been applied to the head to treat headaches[Moerman, 1998]. The flowers are an antidote to poison[Duke and Ayensu, 1985]. The stem bark and the rind of the fruit are diuretic[Duke and Ayensu, 1985]. The fruit is antilithic, diuretic, emetic and refrigerant[Stuart, 1979;Duke and Ayensu, 1985].

The juice of the fruit is used in the treatment of stomach acidity, indigestion and ulcers[Manandhar, 2002]. The seed is vermifuge[Duke and Ayensu, 1985]. A poultice of the boiled seeds has been used in the treatment of boils[Moerman, 1998].

Taken with Achyranthesspp the seed is used to treat aching teeth and gums, boils etc[Duke and Ayensu, 1985]. Extracts of the plant have shown antibiotic activity[Duke and Ayensu, 1985].

In many parts of China 3 grams per day of this species (the report does not say what part of the plant) has been used as a single treatment for diabetes mellitus[Duke and Ayensu, 1985].

Lagenaria vulgaris Ser. (Cucurbitaceae):

Lagenaria vulgaris Ser. is a synonym of Lagenariasiceraria (Molina) Standl.

The record derives from WCSP (in review) (data supplied on 2012-03-23) which reports it as a synonym with original publication details: Memoires de la Société de physique et d'histoire naturelle de Genève.3(1): 25 1825.

LawsoniainermisLinn. Henna plant, Mehdi(Lythraceae):

Lawsoniainermis is a much-branched glabrous shrub or small tree 2-6 m in height, which may be spiny. Bark greyish-brown, unarmed when young, older plants with spine-tipped branchlets. Young branches quadrangular, green but turn red with age.

Leaves opposite, entire, subsessile, elliptic to broadly lanceolate, $1.5-5 \times 0.5-2 \text{ cm}$, glabrous, acuminate; veins on the upper surface depressed.

Flowers small, white, numerous; in large pyramidal terminal cymes, fragrant, 1 cm across, 4 petals crumpled in the bud. Calyx with 2-mm tube and 3-mm spread lobes; petals orbicular to obovate, white or red; stamens 8, inserted in pairs on the rim of the calyx tube; ovary 4 celled, style up to 5 mm long, erect. Fruits small, brown, globose capsules 4-8 mm in diameter, many-seeded, opening irregularly, split into 4 sections, with a persistent style. Seeds 3 mm across, angular, with thick seed coat. The specific epithet means unarmed or without spines. Birds feed on the fruits of L. inermis and probably disperse the seeds.

L. inermis is widely distributed throughout the Sahel and into Central Africa; it also occurs in the Middle East. It growsmainly along watercourses and in semi-arid regions and is adapted to a wide range of conditions. It can withstand low airhumidity and drought. Henna requires high temperatures for germination, growth and development.

Mean annual temperature: 19-270C, Mean annual rainfall: 200-4200 mm.

It prefers sandy soils but can tolerate clays and poor, stony, sandy soils; optimum soil pH is 4.3-8.

It is native to Algeria, Cyprus, Egypt, Eritrea, Ethiopia, Indonesia, Iran, Iraq, Jordan, Kenya, Kuwait, Lebanon, Libyan Arab Jamahiriya, Malaysia, Morocco, Oman, Philippines, Qatar, Saudi Arabia, Syrian Arab Republic, Tanzania, Tunisia, Turkey, Western Sahara, Yemen

It is an exotic species for Australia, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, China, Congo, Coted'Ivoire, Democratic Republic of Congo, Gabon, Gambia, Ghana, Guinea, India, Liberia, Mali, Mauritania, Niger, Nigeria, Pakistan, Senegal, Sierra Leone, Spain, Sudan, Togo, Zanzibar.

Ethnobotanical Potential

Fodder: Leaves of L. inermis are browsed by livestock.

Fuel: Henna is a suitable source of firewood.

Timber: The wood of henna is fine grained, hard, and is used to make tent pegs and tool handles in India.

Fibre: In Turkana, Kenya, the stems are used for making fishing baskets.

Tannin or dyestuff: An orange-red dye is made by crushing the leaves and younger shoots to a grey-green powder. Thepowder is soaked in a mixture of strong tea and lemon juice and is used in Sudan, Middle Eastern countries and manyMuslim communities in Africa for decorating hands, nails and feet with patterns. Henna is also used as a hair dye and conditioner as well as a colouring agent for leather and cloth. It may also be used to stain wood.

Trees are employed in soil conservation to check soil erosion.

L. inermis can be grown as a live fence as well as for shade/shelter.

It is an attractive small tree that can be successfully grown in gardens.

Lawsoniainermis Linn. (Lythraceae) is a very useful medicinal plant in all parts of the world. The leaf powder of henna sap is used for staining hair, nails and beard (Chengaiahet al., 2010). The leaves of Lawsoniainermis are used to treat poliomyelitis, measles among the Yoruba tribe of South Western Nigeria (Oladunmoye and Kehinde, 2011). The seeds of henna have been reported to possess deodorant action and are used in most cases of gynecological disorders such as menorrhagia, vaginal discharge and leucorrhoea (Nawagishet al., 2007).

The leaves of Lawsoniainermis with those of Hibiscus rosa-sinensis, Ecliptaprostrata and seeds of Abrusprecatorius when they are taken in equal quantities and ground into paste which is soaked in sesame oil for 5 days is used as hair oil by the tribes of Andra Pradesh, India (Suneetha et al., 2011). In Turkey, henna which is an extract of Lawsonia sp. is used as hair dye and nail dye in many cultures as decorative dye centuries (Ozaslanet al., 2009). Henna is widely used in the cosmetic industry as dyeing agent also in India (Chengaiahet al., 2010). Reports show that methanolic root extracts of

Lawsonia is used in Nigeria for cosmetic purposes, as antimalarial (Idowu et al., 2010) as well as for abortifacient purposes (Aguwa, 1987). The powdered roasted seed is mixed with gingerly oil to make a paste which is used for the treatment of ring worm. Decoction of the leaves is used for aseptic cleaning of wounds and healing (Kumari et al., 2011). L. inermis is also used by some individuals as 'blood tonic', thus implying its multifaceted use (Idowu et al., 2010).

Roots are regarded as a potent medicine for gonorrhoea and to enhance fertility in women; a decoction of them is considered to be diuretic or for treating blennorrhoea and pectoral for bronchitis. A reported constituent of the leaves is an ox naphthoquinone called lawsone, which has antibiotic properties.

Flower oil contains alpha- and betaionone, the latter being the main component.

Leaf and flower infusions are applied externally for ulcers and rheumatism or are taken orally for tetanus, epilepsy and stomach pains.

Leaves are used in treatment of leprosy, jaundice and scurvy.

Astringent roots are ground and rubbed on the heads of children to treat boils and eye diseases.

In Malaysia, fresh bruised leaves are used as poultices to relieve a burning sensation of the feet; to treat beriberi, skin diseases, boils, circumcision wounds and distension of the stomach; a decoction can also be gargled to treat gum boils, or prescribed to relieve abdominal pains after childbirth.

It is an emmenagogue and an abortifacient. In Indonesia, a paste of the leaves is applied for diseases of the fingernails and for herpes infection; tea made from the leaves is saidto be taken to prevent obesity, and an ointment made from very young fruits treats itches.

In the Philippines, flowers are reported to be soporific.

The fragrant flowers are used as perfume, while small twigs are used as toothbrushes in Indonesia [Orwaet al., 2009].

Henna has a common traditional usage throughout the world. Due to its palliative, curative and healing effects, it is a famous medicinal plant in most cultures.

Lacanoraaffinis Eversm. Crab's eye (Lecanoraceae):

The location of the plant is Africa, Egypt, Sinai Desert [Schallert, 1990].

It is a famine food.

Echeveria affinis is evergreen, low-growing, perennial succulent, up to 20 cm tall and wide. The leaves are fleshy, olive-brownish, up to 5 cm long and up to 2 cm wide, formed on rosettes. The red star-shaped flowers sprout on a stem during the summer.

Lens culinaris MedikLintil, Massor (Fabaceae):

Synonyms

Lens esculentaMoench

Lens culinaris is an annual growing to 0.5 m.

It is not frost tender. The species is hermaphrodite and is pollinated by Cleistogomy (self-pollinating without flowers ever opening). The plant is selffertile.

It can fix Nitrogen

Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil.

It is found in Afghanistan, Africa, Albania, Algeria, Argentina, Asia, Australia, Austria, Bangladesh, Britain, Bulgaria, Burma, Central Europe, Chile, China, Colombia, Czech Republic, East Africa, Ecuador, Egypt, Eritrea, Ethiopia, Europe, Fiji, France, Germany, Greece, Guatemala, Himalayas, Hungary, India, Indochina, Indonesia, Iran, Iraq, Israel, Italy, Japan, Jordan, Kenya, Lebanon, Libya, Madagascar, Malawi, Malaysia, Mauritius, Mediterranean, Middle East, Morocco, Mozambique, Myanmar, Nepal, Netherlands, New Zealand, North Africa, North America, Pacific, Pakistan, Philippines, Portugal, Reunion, Romania, Saudi Arabia, SE Asia, South Africa, Southern Africa, South America, Spain, Sri Lanka, Sudan, Switzerland, Syria, Tajikistan, Tanzania, Tasmania, Thailand, Tunisia, Turkey, USA, Vietnam, Yemen, Zimbabwe,

Seed are cooked or sprouted and eaten raw [Chittendon, 1956]. A very nutritious food [Hill, 1952; Kunkel, 1984], the seeds can be cooked on their own or added to soups, stews etc [Facciola, 1990]. The seed can be soaked for 12 hours in warm water and then allowed to sprout for about 5 days [Phillips and Foy, 1990]. They have a crunchy, fresh flavour [Phillips and Foy, 1990]. Lentils are more digestible than many legumes [Ken Fern]. The dried seed can also be ground into a powder and used with cereal flours in making bread etc [Facciola, 1990], this greatly enhances the value of the protein in the bread. The seed stores better if it is left in its husk [Huxley, 1992]. Young seedpods are used fresh or cooked like green beans [Usher, 1974;Kunkel, 1984; Facciola, 1990].

The seeds are mucilaginous and laxative[Choparaet al., 1986]. They are considered to be useful in the treatment of constipation and other intestinal affections[Choparaet al., 1986]. Made into a paste, they are a useful cleansing application in foul and indolent ulcers[Choparaet al., 1986].

Lens esculenta Moench

Lens esculenta Moench is a synonym of Lens culinaris subsp. culinarisMedik.

The record derives from ILDIS which reports it as asynonym (record 7785).

Loranthus acacia

Plicosepalus acacia

Loranthusacaceae grows in desertregions, where it mostly leeches ontoseveral species of Acacia trees, though it may be found on otherplants it is also occur at agricultural area, natural forests, riparian Zones, Ruderal, Urban areas and wet lands. It is found mainly in East Africa, and the Sudan and it can also befound in Israel; Israel is the mostnorthern spot it can be found.

Loranthusacaceae is a semi- parasitical plant, which means that itproduces its own sugars, but takeswater, minerals and nutrients (mostlynitrogenous) from its host. Its growthcycle depends solely on one species of bird pollinator the Orange TuftedSunbird (Nectarinia Osea Osea). TheLoranthus produces nectar-rich elongated red flowers (the tubercular corolla is 40 mm long) which function as anoasis for the Honey-Sucker birds which pollinate it as they drink its nectar, as well as for bees who try to stealnectar from the little holes the birds puncture on the side of the flower. Apparently, the flowers turn completelyred after pollination (when nectar is no longer produced) and the Sunbirds are attracted to the flower while it isstill green.

This is a strange post-pollination phenomenon since Honey-Suckers can see red and are attracted to redwhich usually indicates the presence of nectar.After pollination, the plant produces red fleshy fruits, which are eaten by yet another bird, mainly Bulbuls, and theseeds are dispersed with the birds' excretion (the seeds aren't harmed while passing via the birds' intestinal tract - presumably by accelerating their digestive system). The fruit can also adhere to the birds' beaks and as they try toremove it (by rubbing their beaks onto he branches), the sticky seeds stick tobranches. The seeds germinateimmediately on the substance theywere deposited on, regardless oflocation, and try to strike roots. If aseed was not deposited on the rightfree or was unable to set roots - it willquickly dry out and perish. Whenever the seed does manage togerminate, it sends absorbing roots-likeorgans (haustoria) that extend through the inner layers of the branches' host, where most of the water transportoccurs.

After a while it mergescompletely with it. Other roots getinterlocked around the host's branch inorder to fasten their grip. The Loranthus creates a mass on thehosts' branches; it is always above ground, never touching the ground, feeding solely through its host. Henceforth, it grows, producing a mass of succulent fleshy leaves, availing itself of the host's water and mineral supply, regardless of the austerity and modesty usually mandated by the desert climate. If the Loranthus' masses of growth on the tree multiply too much, then at a certain point this brings an end to the tree as well as to itself. Deep scars will remain on the tree, marking the penetration holes of the Loranthus' suckers.

This life cycleresembles that of the Viscum Album. A rare plant in the past, the Loranthus is now -with settlement expansion and the population of birds that comes with it (as pollinators and distributers) – much more widespread throughout the desert region infecting more and more trees. From the literature survey it was observed that Loranthusacaciae is a very good medicinal plant [Okoye, 2010] because it is used in complementary and alternative cancer therapy in Europe and it has highly potent in curing circulatory problems, laxative and convulsant [Rani and Naidu, 1995].

In many of the medicinal plants the flowers also has more effect to cure the diseases due to the presence of Phyto chemical constituent flavonoid, it has antimicrobial activity due to flavonoid presence in the flowers of Loranthusacacia [Jayanthi and Marina, 2013].

OcimumbasilicumLinn.Basil, Sweet Basil, Common Basil, Thai Basil, Tropical Basil(Lamiaceae):

Ocimum album, Ocimumanisatum, Ocimumbarrelieri, Ocimum medium, Plectranthusbarrelieri

It is long cultivated, its original habitat is obscure[Bianchiniet al., Fruits of the World]. Range of occurrence is Tropical Asia.

Ocimumbasilicum is a perennial growing to 0.5 m by 0.3 m at a fast rate.

It is frost tender. It is in flower from August to September, and the seeds ripen in September. The species is hermaphrodite and is pollinated by Bees.

Suitable for: light (sandy) and medium (loamy) soils and prefers well-drained soil. Suitable pH: acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It prefers moist soil. Leaves and flowers are consumed raw or cooked[Grieve,1984; Lust, 1983; Vilmorin, 1981].

Used as a flavouring or as a spinach[Holtom and Hylton, 1979; Usher, 1974], they are used especially with tomato dishes, pasta sauces, beans, peppers and aubergines[Bown, 1995]. The leaves are normally used fresh but can also be dried for winter use[Lust, 1983]. A very pleasant addition to salads[Ken Fern], the leaves have a delightful scent of cloves[Grieve, 1984]. The leaves can be used sparingly in cooking because the heat concentrates the flavour[Phillips and Foy, 1990]. A refreshing tea is made from the leaves[Lust, 1983].

The seed can be eaten on its own or added to bread dough as a flavouring [Facciola, 1990]. When

soaked in water it becomes mucilaginous and can be made into a refreshing beverage called 'sherbet tokhum' in the Mediterranean[Facciola, 1990]. An essential oil obtained from the plant is used as a food flavouring in mustards, sauces, vinegars etc[Schery, Pl for Man; Tanaka, 1976; Facciola, 1990].

An essential oil obtained from the whole plant is used as a food flavouring and in perfumery, dental applications etc[Uphof, 1959;Schery, Pl for Man; Usher, 1974; Tanaka, 1976; Hill, 1952; Bown, 1995]. An average yield of 1.5% essential oil is obtained from the flowering tops[Chief, 1984]. When applied to the skin it makes a good mosquito repellent[Chief, 1984]. The growing or dried plant is an effective insect repellent. It is a good plant to grow in the home, where it repels flies, or in the greenhouse where it can keep all manner of insect pests away from nearby plants[Holtom and Hylton, 1979;Riotte, 1978; Ken Fern]. It has been used in the past as a strewing herb[Allardice, 1993].

Sweet basil has been used for thousands of years as a culinary and medicinal herb. It acts principally on the digestive and nervous systems, easing flatulence, stomach cramps, colic and indigestion[Chevallier, 1996].

The leaves and flowering tops are antispasmodic, aromatic, carminative, digestive, galactogogue, stomachic and tonic[Chief, 1984;Holtom and Hylton, 1979; Lust, 1983; Stuart, 1979; Duke and Ayensu, 1985]. They are taken internally in the treatment of feverish illnesses (especially colds and influenza), poor digestion, nausea, abdominal cramps, gastro-enteritis, migraine, insomnia, depression and exhaustion[Bown, 1995].

Externally, they are used to treat acne, loss of smell, insect stings, snake bites and skin infections [Bown, 1995].

The leaves can be harvested throughout the growing season and are used fresh or dried[Bown, 1995]. The mucilaginous seed is given in infusion in the treatment of gonorrhoea, dysentery and chronic diarrhoea[Chopra et al., 1986]. It is said to remove film and opacity from the eyes[Duke and Ayensu, 1985].

The root is used in the treatment of bowel complaints in children[Chopra et al., 1986].

Extracts from the plant are bactericidal and are also effective against internal parasites[Duke and Ayensu, 1985; Bown, 1995].

The essential oil is used in aromatherapy. Its keyword is 'Clearing'[Westwood, 1993]. In Chinese medicine for kidney disease and gum ulcers [Karalliedde and Gawarammana, 2008]. In Indian medicine foe earache, rheumatoid arthritis, anorexia, itching, menstrual disorders, and malaria [Karalliedde and Gawarammana, 2008].

Ocimum sanctum Linn. Holy Basil, Tulsi(Lamiaceae):

Tulsi (Ocimum sanctum) is a widely grown, sacred plant of India. Hindus grow Tulsi as a religious plant in their homes, temples and their farms. They use Tulsi leaves in routine worship. Tulsi, grown as a pot plant, is found in almost every traditional Hindu house. The natural habitat of Tulsi varies from sea level to an altitude of 2000 m. It is found growing naturally in moist soil nearly all over the globe. Tulsi is a branched, fragrant and erect herb having hair all over.

It attains a height of about 75 to 90 cm when mature. Its leaves are nearly round and up to 5 cm long with the margin being entire or toothed. These are aromatic because of the presence of a kind of scented oil in them. A variety with green leaves is called Shri Tulsi and one with reddish leaves is called Krishna Tulsi. Tulsi flowers are small having purple to reddish color, present in small compact clusters on cylindrical spikes. Stalkless heartshaped bracts are there at the base of each flower cluster. Sepal cup is not hairy within. Flowers are rarerly longer than 5 mm, calyx tube bearded outside near base. Flower tube is hairy. The fruits are small and the seeds yellow to reddish in colour.

This herb has been known from as earlyas the vedic period and is held by Hindus and is often plantedarround temples and used in roseries. It is native of India, reached western europe in the 16thcenturies. It is being used in severel ancient systemsof medicine including Ayurveda, Greek, Roman, Siddha and Unani. Ocimum sanctum has vast number of therapeutic applications such as in cardiopathy, homeopathy, leukoderma,asthma, bronchitis, catarrhal fever, vomiting, gastropathy, genitourinary disorders, ring worm, verminosis and skin disease etc. It is commonly used in cough cold, mild indigestion, diminished appetite and malaise.

Its extract has numerouspharmacological activities like hypoglycaemic, immunomodulatory, analgestic, anti-stress, anti-pyretic, antiulcerogenic, anti-inflametory, anti-hypertensive and anti-bacterial. The active constituents of herb include volatile oil eugenal and B-caryophyllene, flavonoids and a number of other components present in fixed oil [Bhatt, 2012].

The seed of unpalatable varieties is normally used and this oil has the lowest percentage of acidity and therefore the best flavour [Bown, 1995]. Other grades of the oil come from seeds that are heated (which enables more oil to be expressed but has a deleterious effect on the quality) or from using chemical solvents on seed that has already been pressed for higher grades of oil. Olive oil is monounsaturated and regular consumption is thought to reduce the risk of circulatory diseases [Bown, 1995]. The seed contains albumen, it is the only seed known to do this [Chief, 1981]. Leaves [Hedrick, 1972]. No more details are given. An edible manna is obtained from the tree [Facciola, 1990].

The non-drying oil obtained from the seed is also used for soap making, lighting and as a lubricant[Lust, 1983;Uphof, 1959; Polunin and Huxley, 1987]. The oil is a good hair tonic and dandruff treatment[Lust, 1983]. Maroon and purple dyes are obtained from the whole fresh ripe fruits[Grae, 1974]. Blue and black dyes are obtained from the skins of fresh ripe fruits[Grae, 1974]. A yellow/green dye is obtained from the leaves[Grae, 1974]. Plants are used to stabilize dry dusty hillsides[Huxley, 1992]. Wood - very hard, heavy, beautifully grained, takes a fine polish and is slightly fragrant. It is used in turnery and cabinet making, being much valued by woodworkers[Grieve, 1984;Chief, 1981;Uphof, 1959;Polumin, 1969].

Ethnomedicinal Potential: The oil from the pericarp is cholagogue, a nourishing demulcent, emollient and laxative [Grieve, 1984;Lust, 1983; Chopra et al., 1986]. Eating the oil reduces gastric secretions and is therefore of benefit to patients suffering from hyperacidity [Bown, 1995]. The oil is also used internally as a laxative and to treat peptic ulcers [Grieve, 1984;Bown, 1995]. It is used externally to treat pruritis, the effects of stings or burns and as a vehicle for liniments [Grieve, 1984;Lust, 1983]. Used with alcohol it is a good hair tonic and used with oil of rosemary it is a good treatment for dandruff [Grieve, 1984;Lust, 1983]. The oil is also commonly used as a base for liniments and ointments [Lust, 1983]. The leaves are antiseptic, astringent, febrifuge and sedative

[Grieve, 1984; Lust, 1983]. A decoction is used in treating obstinate fevers, they also have a tranquillising effect on nervous tension and hypertension [Grieve, 1984; Bown, 1995]. Experimentally, they have been shown to decrease blood sugar levels by 17 - 23% [Chopra et al., 1986]. Externally, they are applied to abrasions [Bown, 1995]. The bark is astringent, bitter and febrifuge [Grieve, 1984;Chopra et al., 1986]. It is said to be a substitute for quinine in the treatment of malaria [Chopra et al., 1986]. In warm countries the bark exudes a gum-like substance that has been used as a vulnerary [Grieve, 1984]. The plant is used in Bach flower remedies - the keywords for prescribing it are 'Complete exhaustion' and 'Mental fatigue' [Chancellor, 1985].

Eugenol (1-hydroxy-2-methoxy-4-allylbenzene),

the active constituent present in Ocimum sanctum

L., has been found to be largely responsible for the

therapeutic potentials of Tulsi. Although because of

its great therapeutic potentials and wide occurrence

in India the practitioners of traditional systems of

medicine have been using Ocimum sanctum L. for

curing various ailments, a rational approach to this

traditional medical practice with modern system of

medicine is, however, not much available [Prakash

and Gupta, 2005]. Olea europaeaLinn.Olive,

Olea europaea is an evergreen Tree growing to 10 m by 8 m at a slow rate. It is in leaf all year, in

flower from August to September. The species is

hermaphrodite and is pollinated by Wind. The plant

is self-fertile. Suitable for: light (sandy), medium

(loamy) and heavy (clay) soils, prefers well-drained

soil and can grow in nutritionally poor soil. Suitable pH: acid, neutral and basic (alkaline) soils. It cannot

grow in the shade. It prefers dry or moist soil and

can tolerate drought. The habitat of the Olive plant

is Woods and scrub in dry rocky places [Flora

Europaea, 1964]. The range of distribution is S.

Olive fruits are widely used, especially in

the Mediterranean, as a relish and flavouring

for foods. The fruit is usually pickled or cured

with water, brine, oil, salt or lye [Hedrick, 1972;

Simmons, 1984; Grieve, 1984; Polumin and Huxley, 1987; Facciola, 1990]. They can also be dried in the

sun and eaten without curing when they are called

'fachouilles'[Facciola, 1990]. The cured fruits are

eaten as a relish, stuffed with pimentos or almonds,

or used in breads, soups, salads etc [Facciola, 1990].

'Olives schiacciate' are olives picked green, crushed, cured in oil and used as a salad [Facciola, 1990]. The

fruit contains 20 - 50µ vitamin D per 100g [Komarov,

1968]. The fruit is up to 4cm long [Huxley, 1992].

The seed is rich in an edible non-drying oil, this

is used in salads and cooking and, because of its

distinct flavour, is considered a condiment[Grieve,

1984; Uphof, 1959; Schery, Pl for the Man; Polunin

and Huxley, 1987; Hill, 1952]. There are various

grades of the oil, the finest (known as 'Extra Virgin')

is produced by cold pressing the seeds without

Europe - Mediterranean.

African olive, European olive(Oleaceae):

Panicum miliaceum Linn. Proso millet, broomcorn millet, common millet, hog millet, Kashfi millet, red millet, and white millet(Poaceae): Leptolomamiliacea (L.) Smyth, Milium esculentumMoench nom. illeg., Milium panicum Mill. nom. illeg., Panicum asperrimum Fisch., Panicum asperrimum Fischer ex Jacq., Panicum densepilosumSteud., Panicum milium Pers. nom. illeg., Panicum ruderale (Kitag.) D.M.Chang, Panicum spontaneumZhuk. nom. inval.

Names for proso millet in other languages spoken in the countries where it is cultivated include: Bengali: cheena, Odia: china bacharibagmu, Kannada: baragu, Telugu: variga, Hindi: chena or barri, Punjabi: cheena, Gujarati: cheno, Marathi: vari, Tamil: panivaragu

Panicum miliaceum is a grain crop with many common names including proso millet, broomcorn millet, common millet, hog millet, Kashfi millet, red milletand white millet[GRIN, 2015 2]. Archeological evidence suggests that the crop was first domesticated before 10,000 BCE in Northern China[Lu et al., 2009] The crop is extensively cultivated in China, India, Nepal, Russia, Ukraine, Belarus, the Middle East, Turkey, Romania, and the United States, where approximately half a million acres are grown each year[nass.usda] The crop is notable both for its extremely short lifespan, with some varieties producing grain only 60 days after planting[5], and its low water requirements, producing grain more efficiently per unit of moisture than any other grain species tested[Gray bosh and Baltensperger, 2009; Lyman and Shantz, 1913]. The name "proso millet" comes from the pan-Slavic general and generic name for millet Croatian: proso). Proso millet is a relative of foxtail millet, pearl millet, maize, and sorghum within the grass sub-family Panicoideae. While all of these crops utilize C4 photosynthesis, the others all employ the NADP-ME as their primary carbon shuttle pathway while the primary C4 carbon shuttle in proso millet is the NAD-ME pathway.

Weedy forms of proso millet are found throughout central Asia, covering a widespread area from the Caspian Sea east to Xinjiang and Mongolia. These may represent the wild progenitor of proso millet or represent feral escapes from domesticated production [Zohary and Hof, 2000] Indeed, in the United States weedy proso millet, representing feral escapes from cultivation, are now common, suggesting current proso millet cultivars retain the potential to de-domesticate, similar to the pattern seen for weedy rice [Thurber et al., 2010] Currently, the earliest archeological evidence for domesticated proso millet comes from the Cishan site in semiarid North East China around 10,000 BCE[Lu et al., 2009] Because early varieties of proso millet had such a short life cycle -- as little as 45 days from planting to harvest. it is thought that they made it possible for semi-nomadic tribes to first adopt agriculture, forming a bridge between huntergatherer focused lifestyles and early agricultural civilizations[smithsonianmag.com] Archaeological evidence for cultivation of domesticated proso millet in east Asia and Europe dates to at least 5,000 BCE in Georgia and Germany (near Leipzig, Hadersleben) by Linear Pottery culture (Early LBK, Neolithikum 5500–4900 BCE), [Korber-Grohne, 1987] and may represent either an independent domestication of the same wild ancestor, or the spread of the crop from east Asia along trade routes through the arid steppes [Hunt et al., 2014]. Evidence for cultivation in southern Europe and the Near East is comparatively morerecent, with the earliest evidence for its cultivation in the Near East a find in the ruins of Nimrud, Iraq dated to about 700 BC[Johary and Hopf, 2000].

Proso millet is a relatively low-demanding crop and diseases are not known; consequently, proso millet is often used in organic farming systems in Europe. In the United States it is often used as an intercrop. Thus, proso millet can help to avoid a summer fallow, and continuous crop rotation can be achieved. Its superficial root system and its resistance to atrazine residue make proso millet a good intercrop between two water- and pesticidedemanding crops. The stubbles of the last crop, by allowing more heat into the soil, result in a faster and earlier millet growth. While millet occupies the ground, because of its superficial root system, the soil can replenish its water content for the next crop. Later crops, for example, a winter wheat, can in turn benefit from the millet stubble, which act as snow accumulators[P& M proso millet]

Due to its C4 photosynthetic system, proso millet is thermophilic like maize. Therefore, shady locations of the field should be avoided. It is sensitive to cold temperatures lower than 10 to 13 degrees Celsius. Proso millet is highly droughtresistant, which makes it of interest to regions with low water availability and longer periods without rain [Markblatt fur, 2014; Hanna and Baltensperger, 2004]. The soil should be light or medium-heavy. Due to its flat root systems, soil compaction must be avoided. Furthermore, proso millet does not tolerate soil wetness caused by dammed-up water[Hanna and Baltensperger, 2004] Gijang-bap (proso millet rice): Proso millet is one of the few types of millet not cultivated in Africa[National Research Council, 2008]. In the United States, former Soviet Union, and some South American countries, it is primarily grown for livestock feed. As a grain fodder, it is very deficient in lysine and needs complementation. Proso millet is also a poor fodder due to its low leaf-to-stem ratio and a possible irritant effect due to its hairy stem. Foxtail millet, having a higher leaf-to-stem ratio and less hairy stems, is preferred as fodder, particularly the variety called moha, which is a high-quality fodder.

In order to promote millet cultivation, other potential uses have been considered recently [Rose and Samtra, 2013]. For example, starch derived from millets has been shown to be a good substrate for fermentation and malting with grains having similar starch contents as wheat grains[Rose and Samtra, 2013]. A recently published study suggested that starch derived from proso millet can be converted to ethanol with an only moderately lower efficiency than starch derived from corn[Taylor et al., 2006].

The development of varieties with highly fermentable characteristics could improve ethanol yield to that of highly fermentable corn[Taylor et al., 2006]. Since proso millet is compatible with lowinput agriculture, cultivation on marginal soils for biofuel production could represent an important new market, such as for farmers in the High Plains of the US[Taylor et al., 2006]. The demand for more diverse and healthier cereal-based foods is increasing, particularly in affluent countries[Saleh et al., 2012].

This could create new markets for proso millet products in human nutrition. Protein content in proso millet grains is comparable with that of wheat, but the share of essential amino acids (leucine, isoleucine and methionine) is substantially higher in proso millet[Saleh et al., 2012]. In addition, health-promoting phenolic compounds contained in the grains are readily bioaccessible and their high calcium content favor bone strengthening and dental health[Saleh et al., 2012]. Among the most commonly consumed products are ready-to-eat breakfast cereals made purely from millet flour [Markblatt fur, 2014;Saleh et al., 2012].as well as a variety of noodles and bakery products, which are, however, often produced from mixtures with wheat flour to improve their sensory quality[Saleh et al., 2012].

Phoenix dactyliferaLinn. khajur, khaji, date palm(Arecaceae): Palma dactylifera (L.) Mill., Phoenix chevalieriD.Rivera, S.Ríos&Obón, Phoenix ibericaD.Rivera, S.Ríos&Obón The common names arewild date palm, date, sugar palm, date palm, ittappuzham, khaji, salma, khajur, sendhi, khorjjuri

Phoenix dactylifera grows to a height of over 30 m; the stem and newleaves grow from the single terminal bud at the stem apex; roots growfrom the base of the trunk, sometimes 50 cm above the ground; mainroots about 1.5 cm thick.

Leaves enormous, up to 7 m long with a relatively short (50 cm) rachisbase or petiole; pinnate, the 50-60 pairs of leaflets long and narrow, attached to a stout central midrib or rachis. They have a normal life of 3-7years.

Inflorescence is produced in the axil of a 1-year-old leaf; a branchedspadix enclosed in a tough spathe that bursts open when the flowers aremature. Male flowers waxy and creamy with 6 stamens and no carpels;female flowers whitish, with 6 rudimentary stamens and 3 carpels.

Fruits are yellow to reddish-brown, each with a single seed up to 2.5 cm. long, deeply grooved, with a very hard endosperm. There are hundreds ofdate cultivars, of which only about 60 are widely grown throughout the 15major date-growing countries.

'Phoenix' is a very old name, used by Theophrastus, indicating that thetree was 1st introduced to the Greeks by the Phoenicians. The specificname derives from the elongated shape of the fruits, resembling thefingers of the hand, from the Greek word 'dactylos' (finger), and the Latinword 'fero' (I bear).

Morocco, Palestine are the native countries whereas Algeria, Egypt, Eritrea, Ethiopia, Greece, India, Iran, Iraq, Israel, Jordan, Kenya, Lebanon, LibyanArab Jamahiriya, Namibia, Pakistan, Saudi Arabia, Somalia, Spain, Sudan, Tunisia, Turkey, UnitedStates of America, Zanzibar are among the exotic countries of documented species distribution.

The tree of dates or the palm date (Phoenix dactylifera L., Family Arecaceae) has played an important role as a food security crop in the Middle East and North Africa region (MENA), providing valuable food for people for the last 5000 years. In appreciation of its fruits, the date tree is referred to as the sacred tree [Porter, 1993], the tree of life [Nixon, 1951], and the bread of the desert [Simon, 1978]. The Latin name of the tree is believed to have been derived from Greek Phoenix daktulos, which means purple or red finger.

Date fruits have enormous scope and potential for use as food because of their nutritional and economical value [Khan and Khan, 2016]. Date fruits contain 6.5–11.5% total dietary fibres (of which 84–94% insoluble and 6–16% soluble dietary fibre), about 1% fat, 2% proteins, and 2% ash and is a rich source of phenolic antioxidants (1–2%) [Yun et al., 2006]. Variations in the chemical composition of date fruits is expected to influence their nutritional value, sensory quality, and industrial utilization. Date seeds, representing 10–15% of the whole fruit [Al-Showian, 1990], [Mossaet al., 1986], is a valuable by-product of date fruit processing industries and is characterized by a high level of water-insoluble mannan fibres and may be used to enhance the fibre content of certain food products.

Food: The most important use of P. dactylifera is for its fruit, which forms the staple diet of many people in Africa and the Middle East and is as well a cash crop for export. The seeds are roasted and kernels ground as a coffee substitute.

Terminal bud leaves are eaten as a vegetable. The sap can be boiled into unrefined sugar.

The fruit is often dried and then eaten raw or used to add sweetness to a variety of foods such as cakes, fruit pies, confectionary etc[Facciola, 1998; Ken Fern]. The fruit is about 5cm long, 2.5cm in diameter, produced in clusters that can be as large as 1,500 fruits[Martin et al., 1987].

Male inflorescence - eaten as a delicacy [Facciola, 1998].

Pollen is eaten[Facciola, 1998].

Fodder: The seeds (stones) when ground and softened by soaking in water are used for feeding camels, goats and horses and have successfully been substituted as a poultry feed.

Fuel: The wood can be used as fuelwood.

Fibre: The leaves are used in mats, ropes, fans and baskets; the petiole yields a fibre, which together with other suitable material is used for insulating boards.

Timber: The trunks are strong and resistant to termites, providing much valued construction timber.

Alcohol: Wherever fruiting is poor, the sap is the main product. It can be drunk fresh, fermented and drunk as toddy, or distilled and drunk as arrack. The yield of sap varies with management and site conditions, but it is in the range of 4-8 1/day.

The plant has several services viz., Erosion control: The leaves are applied in sand dune stabilization.

Shade or shelter: Old leaves of P. dactylifera are used for thatching.

Reclamation: Being a halophytic species, P. dactylifera has been used for decades for the revegetation of salt affected lands in the Mediterranean region.

Boundary or barrier or support: Dried leaves with their stiff, woody rachis are used for fencing.

Soil improver: Prunings of leaves are used as manure.

Ornamental: The genus Phoenix is one of the most widely cultivated groups of palms, its species being extensively used for bold landscape planting, as individual specimens, for avenue planting, and to a lesser extent, as potted plants.

Intercropping: P. dactylifera while young occupies a lot of space, so a decision to introduce it into cultivated fields mustbe taken carefully. But once mature, its wide crown grows high above the field crops, and it little affects the yield ofcultivated crops. In many places, numerous palms are found in arable fields of suitable regions.

Dates are a demulcent, an expectorant and a laxative, and are used to treat respiratory diseases and fever. The tree yields a gum used in treating diarrhoea [Orwaet al., 2014].

Phoenix sylvestris(L.) RoxbKhajur(Arecaceae):

Elate SylvestrisLinn. Elate versicolor Salisb

It is commonly known as wild date palm, date-sugar palm, Indian wild date, Indian winepalm, silver date palm, sugar date palm, sugar palm, khajur, sendhikharjura, khejura, khorjurri, khajjur, khajur, khaajuri, khajuri, kharjurh, kharjuri, kandela, taadii

Wild Date Palm is the wild cousin of the betterknown Date Palm. It looks the same in almost every way, but shorter height at maturity. It varies from 4 to 8 m in height and 40 cm in diameter. The leaves are 3 m long, gently recurved, on 1 m petioles with spines near the base.

The leaf crown grows to 10 m wide and 7.5-10 m tall containing up to 100 leaves. The inflorescence grows to 1 metre with white, unisexual flowers forming to a large, pendent infructescence. The single-seeded fruit ripens to a purple-red colour, and is eaten in India.Trunk rough with scars of fallen leaves, Compound leaf with many pointed leaflets, lower pairs reduced to thorns.

The range of its occurrence is E. Asia -Himalayas from western India to Nepal and Myanmar. The habitat of the plant is open forest and grassland[pacsoa]. Commonly found on low ground in the sub-Himalayan tract, along river banks and on stretches of low ground. It can be found in open tropical rainforest, open forest and grassland[ecocrop]. Phoenix sylvestris is commonly known as Indian date and is native to India and southern portions of Pakistan. It is traditionally important and known for its nutritional values throughout the world. It is a rich source of carbohydrate, phenols, amino acids, flavonoids, tannins, alkaloids, terpenoids, dietary fibres, essential vitamins and minerals. Different parts of the plant exhibit diverse medicinal properties such as being antipyretic, cardiotonic, laxative, diuretic and antioxidant.

Phoenix sylvestris, one traditional plant, is widely known as Wild date palm. The synonyms of P. sylvestris are Date-sugar palm, Indian wild date, Indian wine palm, Silver date palm, Sugar date palm, and Sugar palm. The word Phoenix means purple, while 'sylvestris' means wild. This palm produces edible fruits but it is generally called Wild date palm to distinguish it from the closely related Phoenix dactylifera, which is known as Date palm and is cultivated agriculturally as the commercial source of edible dates.

Fruits are consumed fresh or dried.

Fodder is browsing resistant.

Plant is a poor fuelwood.

Plant has several services viz., as a wind break, live fence, and a good nectar source.

System of medicines is used inAyurveda, Folk medicine, Sowa-Rigpa, Siddha.

Leaf, root, fruit and seeds are used in medicinal purposes.

In Indonesia and India, sugars derived from P. sylvestris[Murphy and Briscoe, 1999] are considered more nutritious than cane sugar [Rangaswami, 1977; Morton, 1988]. Fresh sap of P. sylvestris is highly rich in vitamin C [Barhet al., 2005]. P. dactylifera fruits are useful in the treatment of sore throats, fever, colds, intestinal troubles, bronchial catarrh, gonorrhea, edema, cystisis and liver and abdominal issues (Morton, 1987). The sap is used as micronutrients and acts as a source of iron and vitamins that improve the vitamin B12 level in anemic patients (Barh and Mazumdar, 2008).

The fruit serves as a tonic and restorative, and is also used as an analgesic to mitigate pain from backache and in the buttocks. In addition, it is widely used as an aphrodisiac, sweetener and diuretic and in the treatment of vomiting, vertigo and unconsciousness.

Dates contain a good amount of dietary fibre and facilitate evacuation of the bowels. Dried dates improve cardiovascular health by soaking out all the cholesterol from the arteries. They have high calcium content and improve bone health. Generally, the juice of P. sylvestris is consumed as a cooling beverage (Sravaniet al., 2010).

The leaf is useful in eye inflammation (Kambleet al., 2011) and the central tender part of the plant cures gonorrhoea and gleet.

Roots of P. sylvestris are useful in toothache and are recommended for nervous debility. The gum of the plant is also found to be beneficial in genitalurinary disorders and diarrhoea.

The plethora of literature reviews describe the use of different plant parts such as roots, leaves, fruits, juices and saps utilized by different tribal communities and local peoples of different regions of India, Pakistan and Bangladesh for the treatment of various ailments. Ethnopharmacological uses of P. sylvestris plant parts are described as Heart wood is used for improvement of increasing lactation; Fruits for toothache andgonorrhoea, asthma, cough, dehydration, diarrhoea, fever, problems, heart-related pains, toothache, tuberculosis, as laxative, strengthen body,cardio tonic,aphrodisiac seminal weakness, general debility, headache, piles, fever arthritis, tonic,cold flu, good source of vitamins B and C, diuretic, diabetes, demulcent, male fertility, body strength; root in toothache, dysentery; seed (decoction) dysentery; fruit juice in constipation, general weakness, gonorrhoea, cough, fever etc.

PistaciaveraLinn. Pistachio, Pistachio Nut (Pistaciaceae):

Pistacia vera is a deciduous tree growing to 10 m at a medium rate.

The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). The plant is not self-fertile.

Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil. Suitable pH: acid, neutral and basic (alkaline) soils and can grow in very alkaline soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

Pistacia vera is found on hilly and mountainous regions, especially on sandstone soils, with a temperature range from -10°c in the winter to 40°c in the summer, to 1500 metres[Huxley, 1992]. Woodland Garden Sunny Edge.The range of its occurrence is West Asia.

Seeds are consumed raw or cooked [Hedrick, 1972;Uphof, 1959; Usher, 1974; Komarov, 1968].

The seed is rich in oil and has a pleasant mild flavour [Hedrick, 1972]. It is very nice when eaten raw and is also widely used in confectionery, ice cream, cakes, pies etc [Facciola, 1990].

An edible oil is obtained from the seed but is not produced commercially due to the high price of the seed [Facciola, 1990]. The fruits can be made into a flavourful marmalade [Facciola, 1990].

The seed yields up to 40% of a non-drying oil. It is not used commercially due to the high value of the seed for food [Facciola, 1990]. Male trees yield a small quantity of a high-grade resin. It is used in paints, lacquers etc [Komarov, 1968].

The plant is used in China for the treatment of abdominal ailments, abscesses, amenorrhoea, bruises, chest ailments, circulation, dysentery, gynecopathy, pruritus, rheumatism, sclerosis of the liver, sores and trauma [Duke and Ayensu, 1985]. The seed is said to be sedative and tonic [Choparaet al., 1986].

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State the background of the study and purpose of the study and summarize the rationale for the study or observation.

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The methods section should include only information that was available at the time the plan or protocol for the study was written such as study approach, design, type of sample, sample size, sampling technique, setting of the study, description of data collection tools and methods; all information obtained during the conduct of the study belongs in the Results section.

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Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations. Extra or supplementary materials and technical details can be placed in an appendix where it will be accessible but will not interrupt the flow of the text; alternatively, it can be published only in the electronic version of the journal.

Discussion

Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms)? Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

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List references in alphabetical order. Each listed reference should be cited in text (not in alphabetic order), and each text citation should be listed in the References section. Identify references in text, tables, and legends by Arabic numerals in square bracket (e.g. [10]). Please refer to ICMJE Guidelines (http://www.nlm.nih.gov/bsd/uniform_ requirements.html) for more examples.

Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540–7.

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Article in supplement or special issue

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Corporate (collective) author

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Chapter in book

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Reference from electronic media

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