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PROSOPIS CINERARIA (GHAF): A POTENTIAL DESERT NUTRACEUTICAL

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ABSTRACT

Prosopis cineraria (Ghaf) is considered as one of the highly valued trees in many arid and dry areas in the world. Historically, this tree has drag attention for its various uses therefore, in 2008, it was declared the national tree of the UAE not only for its sustainability through low water consumption and its ability to maintain desert ecosystems, but also for its many cultural uses. Ancient literature from Arabian Gulf and Indian desert illustrated the importance of the tree in treated various ailments like asthma, dysentery, leucoderma, leprosy, dyspepsia, earache, etc. The *P. cineraria*is not well known as a rich and sustainable source of proteinfor many people in the world. It emphasis on its broad food and non-food applications, nutritional values and health benefits. The Ghaf plant is a keystone species having multiple beneficial uses from combating desertification and improving soil fertility in arid environments to being an essential food source, as well as a source of fuel, shelter and medicine for both humans and animal species. The present research work, describescomparison between the nutrient content of ghaf leaves with spinach and lettuce.

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INTRODUCTION

The continuous world population growth, inadequate protein sources, exorbitant cost of animal protein is considered the main reasons for malnutrition and undernourishment among people living in many developing countries around the world. *P. cineraria* is one of the most drought-tolerant tree species and thrives in hot, arid regions with an annual rainfall of less than 500 mm. In 2008, it was declared as the national tree of the UAE where it is known as Ghaf because of its great cultural and traditional significance. The beautiful, valuable Ghaf is the evergreen tree of the desert. The Ghaf tree, able to withstand the harsh desert environment and still remain green. It can be found on low sand dunes and its presence is an indicator there is water underground. The Ghaf can live up to 120 years. Trees of *Prosopis* genus, which belongs to the Leguminosae family, are one of the most important source of proteins in arid and semi-arid regions. The genus *Prosopis* belongs to Leguminosae family, subfamily Mimosoideae and accommodates 44 species of which 40 are native to North and South Americas, three originate in Asia, and one comes from Africa (Burkart 1967; Leakey, 1980).

Trees of *Prosopis*are widespread in Western Asia, Africa and arid and semi-arid regions in the Americas and Australia.

Botany

Ghaf: *P. cineraria* is an evergreen, thorny tree, 10–25 m in high. The stem is commonly straight, unbranched for several meters with a grey roughish, exfoliated bark (Figure 1).

P. cineraria has been valued by different communities and cultures for the versatility of all its parts and named as "the Wonder Tree" or "King of Desert" (USNAS, 1980) or "the Golden Tree of Indian deserts" (Liu *et al*, 2012). The tree parts including leaves, pods, seeds and barks has been used in many ways as food, i.e., flour, drink, vegetable, and gum. Leaves and pods are used for ruminant and animal feed. *P. cineraria* extensively used in traditional medicine to cure many diseases such as ailments like leprosy, dysentery, asthma, leucoderma, dyspepsia and ear ache (Al-Aboudi *et al*, 2010; George *et al*, 2011; Garg *et al*, 2013). Barks are used for non-nutritional purposes, i.e., wood, tanning, fuel, firewood and charcoal. The Prosopis cineraria has many chemical constituents as alkaloid, steroids, alcohol and alkane.

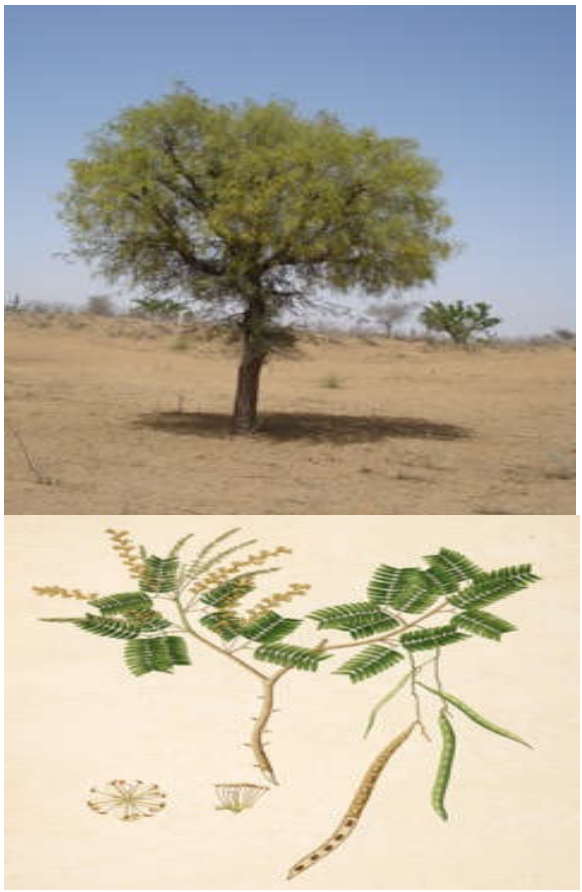

Figure 1. The tree of *Prosopis cineraria*, flower, leave and pods (Wikimedia.org and botanicimage.com)

Lettuce

Figure 2. Lettuce plant (Wikipedia) and leaves

Lettuce (*Lactucasativa*) is an annual plant of the daisy family, Asteraceae. It is most often grown as a leaf vegetable, but sometimes for its stem and seeds (Figure 2). Lettuce is most often used for salads, although it is also seen in other kinds of food, such as soups, sandwiches and wraps; it can also be grilled (*Hugh Fearnley-Whittingstall,* 2013). *L.sativa* is a member of the Lactuca (lettuce) genus and the Asteraceae (sunflower or aster) family ("*Lactucasativa* L, 2010). The species was first described in 1753 by Carl Linnaeus in the second volume of his Species Plantarum ("The Linnaean Plant Name Typification Project",2015). Depending on the variety, lettuce is an excellent source (20% of the Daily Value, DV, or higher) of vitamin K (97% DV) and vitamin A (21% DV), with higher concentrations of the provitamin A compound, beta-carotene, found in darker green lettuces, such as Romaine ("Lettuce" 2012). With the exception of the iceberg variety, lettuce is also a good source (10-19% DV) of folate and iron ("Lettuce", 2012).

Spinach

Figure 3. Spinach leaves

Spinach (*Spinaciaoleracea*) is a leafy green flowering plant native to central and western Asia. It is of the order Caryophyllales, family Amaranthaceae, subfamily Chenopodioideae. Its leaves are a common edible vegetable consumed either fresh, or after storage using preservation techniques by canning, freezing, or dehydration (figure 3). It may be eaten cooked or raw, and the taste differs considerably; the high oxalate content may be reduced by steaming (Wikipedia). Despite fabulous importance of ghaf in desert culture, there is minimal aware by the developed communities about P. cineraria as nutraceutical. Therefore, to meet the increasing demand of nutrition and protein, alternative strategies and unconventional sources of nutrition and protein for human and animal, this study have been considered recently.Hence, the objectives of the study were to compare the nutrient content of ghaf leaves with spinach and lettuce. This research was carried out as anawareness of nutrition value of ghaf plant as nutraceutical.

MATERIAL AND METHODS

Sample collection: Samples of leaves (five) of ghaf were collected from Dahan garden, Ras Al Khaimah, UAE. Samples (five) of spinach and lettuce were collected from local supermarkets of Ras Al Khaimah, UAE. Samples were kept in sterile polythene bags till their use.

Chemicals: The chemicals used in the present investigation were of analytical grade and of high purity from Merck. Standard used for analysis were purchased from Germany and USA.

Preparation of sample for nutrient analysis: The samples (leaves) were washed with sterile water.Weighed 10gof sample (each) by analytical balance (RADWAG-PS2100.R2, Poland) and transferred it into sterile mortar pestle and then groundedthe sample to make a clear fine solution (figure 4).Transferred thesample into volumetric flask and diluted up to 100 mL (sample concentration 10%). Further diluted the sample 5 mL to 100 mL with help of water. Filtered the sample with help of 41 filter paper. Collected clear sample and used this sample for nutrient analysis by Hatch spectrophotometer –DR3900 (Germany).

Figure 4. Sample preparation for Nutrient Analysis

Sample preparation for Essential metal analysis: Weighed accurately 1g of each sample and transfer it into digestion vessel. Added 1.0 mL of water in each sample and 4.0 mL of nitric acid, fumes were generated, waited until fume colour become a white. Tight the digestion cell with assembly and keep it in CEM Mars microwave (MARS6 – 240, USA) digestion according to serial number. Selected the program of digestion and start digestion, waited until digestion finished, after finished digestion, cell was removed from oven and lose the connections and kept it for few minutes. Brown coloured fumes were evolved and further transferred this sample to 50 mL volumetric flask. Diluted the solution with distilled water and used this solution for heavy metal analysis by Atomic Absorption Spectrophotometer (AAS-Shimadzu -AA7000 Japan).

Statistical analysis: Data are expressed as mean. Pair wise comparisons were performed. Experimental error was determined for triplicate and expressed as standard deviation (SD).

RESULTS AND DISCUSSION

This is probably the first report of comparison of ghaf nutrient content and metal, with spinach and lettuce. In the present investigation the leaves of ghaf, spinach and lettuce were used for nutrient analysis and essential metal analysis. For nutrient analysis in all types of samples, Hatch spectrophotometer was used. Different types of nutrient like sulphate, potassium, ammonia, phosphorous, nitrate was investigated (Table 1).

Table 1. Nutritional values of Ghaf compared with spinach and lettuce

Elements	Ghaf (mg/g)	Lettuce (mg/g)	Spinach (mg/g)
Sulphate	5.1	3.84	3.45
Potassium	0.5035	0.0626	0.06405
Ammonia	0.0037	0.00475	0.00485
Phosphorous	0.34	0.3175	0.1825
Nitrate	1.35	1.17	1.08
Copper	0	0	0
Nickel	0	0	0
Zinc	0	0	0
Iron	0.01878	0.00002	0.00093
Calcium	0.4363	0.0338	0.088028
Lead	0	0	0
Magnesium	0.1371	0.0286	0.08744

According to the present research findings, Ghaf leaves have maximum amount of sulphate and potassium 5.1 mg/g and 0.5035 mg/g as compared to lettuce and spinach. Maximum amount of iron (0.01878mg/g), magnesium (0.1371mg/g), calcium (0.4363mg/g) was detected as compared with spinach and lettuce (Table 1, figure 5). Similar work was reported by Ghazanfar et al, 2011.*Prosopis* flour is gluten-free, and a premium source of calcium, potassium, magnesium, zinc, and iron, in addition to amino acids such as lysine that is low inother cereals (Pasiecznik et al; 2004 and Saura-Calixto, 1999). There were not found any traces of copper, nickel, zinc, lead in any of the samples. Amount of phosphorous and nitrate in ghaf leaves detected more than lettuce and spinach.

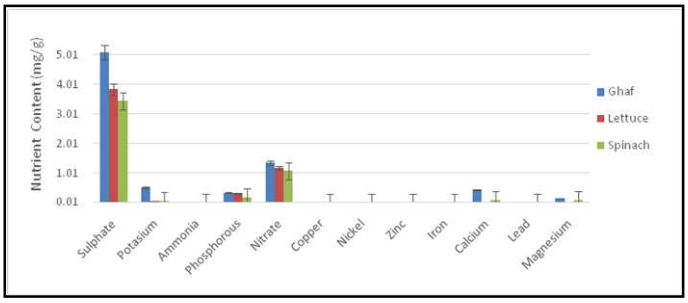

Figure 5. Graphical Comparison of Nutrients and metals between Ghaf, spinach and lettuce

Conclusion

P. cineraria is an important feed species under traditional livestock production systems in the arid regions. Leaves are highly palatable, nutritious and eaten readily by camels, cattle, sheep and goats. *P. cineraria* is a naturalized constituent of many natural and cultivated ecosystems in the world. Its value, however, lies not only in its ability to thrive under adverse conditions, but also can be use as nutraceutical or other useful product. According to the results of analysis, we tried to bring the attention toward this significant tree can be used as a source of functional foods which can be added value in food product development. The ghaf leaves are full of nutrient content as compared to spinach and lettuce. So, can be used as food product. Future efforts are required to be focus on implementation of environmental conservation strategies for achieving sustainableuses of *P. cineraria* and maintain its

benefits to livelihood and coming generation and can be used in value added products.

Ethics approval and consent to participate: Not applicable.

Consent for publication: Not applicable.

Availability of data and materials: The relevant data and materials are available in the present study.

Competing interests: The authors declare that they have no competing interests. All procedures followed were in accordance with the ethical standards (institutional and national).

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REFERENCES

"Lactuca sativa L". Integrated Taxonomic Information System. Archived from the original on 25 October 2011. Retrieved 27 March 2010.

"Lettuce". University of Illinois Extension. Archived from the original on 15 March 2012. Retrieved 25 March 2012.

"The Linnaean Plant Name Typification Project". Natural History Museum. Archivedfrom the original on 22 December 2015. Retrieved 17 December 2015.

Al-Aboudi A, Afifi FU. Plants used for the treatment of diabetes in Jordan: A review of scientific evidence. Pharmaceutical Biology. 2010;49:221-239. DOI: 10.3109/13880209.2010.501802.

Burkart A. A monograph of the genus *Prosopis* (Leguminosae sub. Fam. Mimosoideae).Journal of the Arnold Arboretum. 1976;57(4):219-249, 450-525

Burkart A. Leguminosas. In: Carlos S. Flora de la Provincia de Buenos Aires. BuenosAires: Colecc. Cientifica del INTA; 1967. Part 3. p. 394-647

Garg A, Mittal SK. Review on *Prosopis cineraria*: A potential herb of Thar desert. DrugInvention Today. 2013;5:60-65. DOI: 10.1016/j.dit.2013.03.002

George C, Lochner A, Huisamen B. The efficacy of *Prosopis glandulosa*as antidiabetic treatmentin rat models of diabetes and insulin resistance. *Journal of Ethnopharmacology.* 2011;137:298-304. DOI: https://doi.org/10.1016/j.jep.2011.05.023

Ghazanfar S, Latif A, Mirza IH, Nadeem MA. Macro-minerals concentrations of majorfooder tree leaves and shrubs of district chakwal, Pakistan. Pakistan Journal of Nutrition.2011;10(5):480-484.

Hugh Fearnley-Whittingstall. "Grilled lettuce with goats' cheese". *BBC.* Archived *from the original on 17 July 2013. Retrieved 17 May 2013.*

Leakey RRB, Last FT. Biology and potential of *Prosopis* species in and environments withparticular reference to *P. cineraria*. Journal of Arid Environments. 1980;3:9-24

Liu Y, Singh D, Nair MG. Pods of Khejri (Prosopis cineraria) consumed as a vegetable showed functional food properties. Journal of Functional Foods. 2012;4:116-121. DOI: 10.1016/j.jff.2011.08.006

Pasiecznik NM, Harris PJC, Smith SJ. Identifying Tropical *Prosopis* Species: A FieldGuide. Association HDR. Coventry, UK: HDRA Publishing; 2004. 26 p.

Saura-Calixto F. New food products from *Prosopis* fruits in Latin America: A base for theextension of the culture and prevention of desertification in arid zones. pp. 265-268. In:Summary reports of European Commission supported STD-3 projects (1995-1997);1999.CTA. www.agricta.org/pubs/std/vol2/pdf/341.pdf.

USNAS (United States National Academy of Sciences). Firewood Crops: Shrub and Tree Species for Energy Production. Washington, DC: National Academy Press; 1980.pp. 150-151. DOI: https://doi.org/10.17226/21317

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