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Short Communication

Preliminary assessment of nutritional value of palm heart of *Phoenix sylvestris* (Roxb.)

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Abstract

Phoenix sylvestris (wild date palm) plays an important role in the diet of the inhabitants of tribal area of southern Rajasthan. There is a lacuna in the study of its nutritional value and its potential as an alternative source of food. In the present study the quantitative determination of proximate composition of carbohydrate, protein, lipid, minerals and vitamins present in the palm heart of *Phoenix sylvestris* has been done by standard analytical techniques. The palm heart of *Phoenix sylvestris* showed highest amount of carbohydrate (11.63%), crude protein (10.93%), crude fiber (3.24%), reducing sugar (2.68%), crude lipid (2%) and small amount of ash (1.2%). The palm heart of *Phoenix sylvestris* also has a high energy value (108.24 kcal/100 g). It is rich in Vitamin B3 (1.34 mg/100 g) and Vitamin C (5.52 mg/100 g). This study concluded that the palm heart of *Phoenix sylvestris* contained highest amount of carbohydrate, protein and lowest amount of minerals as compared to palm heart of *Euterpe* spp. The results revealed that palm heart of *Phoenix sylvestris* is a good nutrient supplement and is opulent in carbohydrate, crude protein, vitamin B complex, vitamin C and vitamin K. It can be used as good alternative source of cabbage or vegetable and to alleviate hunger and malnutrition.

Introduction

The importance of wild plants in subsistence agriculture in the developing world as a food supplement and as a means of survival during times of drought, famine has been overlooked. The consumption of wild plants seems more common and widespread in food insecure areas where a wide range of species are consumed. Local people know about the importance and contribution of wild plants to their daily diet. Wild plant species continue to provide important energy and micronutrient needs during drought and social and political unrest. Inspite of the role of edible wild plants in bridging period of food shortages and providing dietary variety, very little attention has been given to the inventory and conservation of such species. Compositional knowledge of these plant materials could help in developing technological processes to make the plant material edible and more digestible.

Palms represent the third most important plant family for human use (Johnson, 1995, 1996, 1998). Numerous edible products are obtained from palms, including the familiar date palm fruits, coconut palm nuts, and various palm oils. Some lesser/underutilized known edible palm product is palm "Cabbage" or "Palm heart". During the study it was found that the sap, meristematic portion and fruits of *Phoenix sylvestris* are used as good source of nutrition. In the scarcity period, meristematic portion (farinaceous deposit at the apex) of *Phoenix sylvestris* is also eaten raw by the tribals as a tonic. Edible part of this plant is meristematic portion of the stem i.e. "Palm heart" which is called "Bari" in local dialect. This is a well- known source of protein and consumed like a Cabbage.

Although most palm products are not available commercially, Palm heart is a major part of food industry in central and South America. This industry primarily exploits the following three species, listed in descending order of importance: *Euterpe oleracea*, *Bactris gasipaes* and *E. edulis*. Some genera [*Astrocaryum aculeatum* (Anderson, 1978; Gertsch *et al*., 2002), *Borassus aethiopum* (Sambou *et al*.,1992), *Brahea brandegeei* (Hodge,1980a), *Copernicia prunifera* (Johnson, 1972), *Dypsis ankaizinensis* (Dransfield and Beentje, 1995), *Dypsis hovomantsina* (Dransfield and Beentje, 1995), *Phoenix acaulis* (Haynes and McLaughlin, 2000), *Phoenix dactylifera* (Hodge,1980b), *P. loureiroi* (Padmanabhan and Sudhersan, 1988), *Ravenea sambiranensis* (Beentje, 1994; Byg and Balslev, 2003)] of palm family are able to produce palm heart. The wild date palm (*Phoenix sylvestris*) is locally known as Khajur. It is one of

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most common palm. The present paper is an attempt to determine the nutritional value of palm heart (locally known as "Bari") of this wild date palm.

Material and Methods

Plant material

The tree grows on farmland boundaries, home-steads and marginal land in rural districts. It is cultivated in orchards or raised by planting wild or nursery-raised seedlings. For the present studies the sap was collected from tribal dominated area of Jhadol Tehsil of Udaipur district of southern Rajasthan. The plant material collection in the month of December as sap production in this plant starts from mid October and continued to mid March of next year.

Method of collection

To collect heart of palm, the tree is cut down and the bark is removed leaving layers of white fibers around the center core. The central core portion is considered more delicious.

Proximate analysis

The methods recommended by the Association of Official Analytical Chemists,18th edition (AOAC, 2005) and Indian standards were used to determine crude protein (921.20), crude lipid (922.06), crude fibre (993.21), ash (IS:2860:1964), carbohydrate (IS:1656:2007) and reducing sugar (IS:4079:1967).

Vitamin analysis

Methods were opted for the determination of vitamins by the Indian standards, AOAC 18th edition and Elisa Kit. Vitamin A (IS: 5886:1970), vitamin C (IS: 5838:1970), vitamin D2 & D3 (IS: 5835:1970). Vitamin K(974.30), vitamin B1(942.23), vitamin B2(970.65), and vitamin B3(961.14) was determined by AOAC 18th edition (AOAC, 2005). Vitamin B5 (Pantothenic acid, Cat#P1005), vitamin B6 (Pyridoxine, Cat#P1008), vitamin B9 (Folic acid, Cat#P1001), Vitamin B12 (Cyanocobalamin, Cat#1002) and Vitamin H (Biotin, Cat#P1003) was measured by VitaFast® microbiological microtiter Plate Test kits.

Mineral analysis

For mineral analysis the methods recommended by the Association of Official Analytical Chemists, 18th edition (AOAC, 2005) were used to determine calcium and sodium (985.35), copper (991.11), zinc (969.32), phosphorus (991.25), magnesium (936.07), potassium (965.30) and iron (999.11).

Results and Discussion

Proximate composition

The result of proximate composition analysis of palm heart of *Phoenix sylvestris* is summarized in Table 1. The estimated Crude fibre content (3.24 g/100 g) in Palm heart of *Phoenix sylvestris* is much higher than the *Bactris gasipaes* (1.05 g/100 g) (Ferreira and Paschoalino, 1987; Tabora *et al*., 1993), *Euterpe edulis* (0.89 g/100 g) and *Euterpe oleracea* (0.27 g/100 g) (Quast and Bernhardt, 1978; Johnson, 2010).

Plessi *et al*. (1999) found that plant food that provides more than 12% of their calorific values from protein are a good source of protein. In that context, crude protein content (10.93 g/100 g) in Palm heart of *Phoenix sylvestris* is significantly higher than *Bactris gasipaes* (2.32 g/100 g) (Ferreira and Paschoalino, 1987; Tabora *et al*., 1993), *Euterpe edulis* (2.42 g/100 g) and *Euterpe oleracea* (1.72 g/100 g) (Quast and Bernhardt, 1978; Johnson, 2010).

Palm heart of *Phoenix sylvestris* have good Source of sugar (11.63 g/100 g) is higher than the *Bactris gasipaes* (2.7 g/100 g) (Mora-Urpi *et al*., 1991; Tabora *et al*., 1993). Reducing Sugar (2.68 g/100 g) is also higher than the *Euterpe edulis* (0.49 g/100 g) and *Euterpe oleracea* (0.30 g/100 g) (Quast and Bernhardt, 1978; Johnson, 2010). Palm heart of *Phoenix sylvestris* has high calorific value (108.24 kcal). High calorific value fulfills the energy requirement of metabolic processes.

The ash content is an index of mineral content. Palm heart of *Phoenix sylvestris* shows 1.2 g/100 g ash value which is close to that the values reported for other edible palm heart such as *Bactris gasipaes* (1.21 g/100 g) (Ferreira and Paschoalino, 1987; Tabora *et al*., 1993), *Euterpe oleracea* (0.83 g/100 g) and less than *Euterpe edulis* (1.43 g/100 g) (Quast and Bernhardt, 1978; Johnson, 2010). It is apparent that palm heart of *Phoenix sylvestris* is not a good source of minerals.

Vitamin composition

Table 2 shows the distribution of different types of vitamins in Palm heart of *Phoenix sylvestris* like vitamin A, vitamin B1, vitamin B2, vitamin B3, vitamin B6 and vitamin K with concentration 0.0039, 0.067, 0.70, 1.34, 0.18 and 0.0042 mg/100 g, respectively. The estimated Vitamin C content (5.52 mg/100 g) in palm heart of *Phoenix sylvestris* is found to be higher than the *Bactris gasipaes* (3.20 mg/100 g) (Ferreira and Paschoalino, 1987; Tabora *et al.*, 1993) *Euterpe edulis* (1.8 mg/100 g) and *Euterpe*

Table 1. Proximate, vitamins and mineral composition of palm heart of *Phoenix sylvestris* (L.) Roxb.

Parameters	Concentration
Water (%)	52
Crude protein (g/100g)	10.93
Crude lipid (g/100g)	2
Crude fibre (g/100g)	3.24
Ash (g/100g)	1.2
Carbohydrate (g/100g)	11.63
Reducing sugar (g/100g)	2.68
Non-reducing sugar (g/100g)	8.95
Total Solids (g/100g)	48
Vitamin A (mg/100g)	0.0039
Vitamin B1 (Thiamine) (mg/100g)	0.067
Vitamin B2 (Riboflavin) (mg/100g)	0.70
Vitamin B3 (Niacin) (mg/100g)	1.34
Vitamin B5 (Pantothenic Acid) (mg/100g)	B.D.L.
Vitamin B6 (Pyridoxine) (mg/100g)	0.18
Vitamin B9 (Folic Acid) (mg/100g)	B.D.L.
Vitamin B12 (Cyanocobalamin) (mg/100g)	B.D.L.
Vitamin C (Ascorbic Acid) (mg/100g)	5.52
Vitamin D2 & D3 (Cholecalciferol) (mg/100g)	B.D.L.
Vitamin H (Biotin) (mg/100g)	B.D.L.
Vitamin K (Phytonadione) (mg/100g)	0.0042
Calcium (mg/100g)	490
Magnesium (mg/100g)	10
Potassium (mg/100g)	2580
Phosphorus (mg/100g)	380
Sodium (mg/100g)	160
Copper (mg/100g)	0.27
Zinc (mg/100g)	0.76
Iron (mg/100g)	1.58

B.D.L.: Below detection level

oleracea (1.4 mg/100 g) (Quast and Bernhardt, 1978; Johnson, 2010). It revealed that, Palm heart of *Phoenix sylvestris* may be considered as healthy and nutritious cabbage which provides a wide range of essential nutrients and potential health benefits.

Mineral composition

Table 3 shows that the results of the mineral concentration of palm heart of *Phoenix sylvestris* are higher than the reported values of Calcium (114.0 mg/100 g), Magnesium (80 mg/100 g), Potassium (337.6 mg/100 g), Phosphorus (94.0 mg/100 g), Sodium (1.33 mg/100 g), Copper (0.159 mg/100 gm), Zinc (0.79 mg/100 g) and Iron (4.3 mg/100 g) by Ferreira and Paschoalino, 1987; Tabora *et al*., 1993.

Conclusion

All the results of proximate composition, mineral and vitamin analysis showed that palm heart of Phoenix sylvestris is a good source of carbohydrate, crude protein, crude lipid, crude fiber, energy, vitamin B complex, vitamin C, vitamin K and minerals when compared with other commonly consumed palm heart which merits consideration as alternative source for human diet.

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