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NEOLAMARCKIA CADAMBA (KADAM) FRUIT: AN UNTERUTILISED NUTRITIOUS FUIT: A REVIEW

SOMA SAHA
Assistant Professor & HOD
Department of Food & Nutrition
Hiralal Mazumdar Memorial College for Women
Dakshineswar Kolkata

ABSTRACT

Native to South and Southeast Asia, Neolamarckia cadamba is a member of the Rubiaceae family of plants. This tree produces edible fruit that is said to contain iron, copper, zinc, chromium, calcium, and magnesium. Vitamins like beta carotene and ascorbic acid are also present. The Kadam fruit also possesses good pharmacological properties, including anti-inflammatory, anti-microbial, anti-diabetic, and antioxidant properties. Every year it is wasted because it is less known and because of ignorance. More studies and education are required to help individuals include this inexpensive, readily accessible, underappreciated, but nutrient-dense fruit in their diets.

KEYWORDS: Kadam, underutilised, antioxidant, nutritious.

INTRODUCTION

India is the home of about one third of world's poor people [1]. Undernutrition is one of the burning problems of the developing countries like India . About 6 millions childrens dies every year due to undernutrition [2]. The causes behind it are ignorance, inadequate food consumption, improper food distributions, inavailability of medical facilities and various other factors [2].

Due to ignorance most of the people consume common conventional food stuff and therefore neglect large no of fruits and vegetables that grown easily, low cost and also nutritious. So it is most important to identify and incorporate that underutilised low cost nutritious vegetables and fruits in the daily diet to improve nutritional status of the people and to fignt against undernutrition and to improve food security [3].

Neolamarckia cadamba commonly known as Kadam is belongs to the family Rubiaceae is an indigenous plant of south Asia and southeast Asia [4]. It is a large tree that is basically used in our country for home decoration, worshipping, to get match stick and paper pulp. It is commonly found in roadside , garden, parks[5]. Flower of the tree basically used to make perfume. Its various parts are recommended to use in aurveda, siddha and unani medicine to treat various disease. But due to lack of awareness, research work, its fruits are neglected, wasted and people donot know that the fruit is edible. [6]

AIMS AND OBJECTIVES

- To study thescientific literarure on Neolamarckia cadamba.
- To provide information about the nutrititive vakue and phytochemical properties of kadam fruit to people
- To get an idea about its medicinaland therapeutic benefits.
- To create awareness and to promote consumption of kadam among people.

DISCUSSION

Plant Profile: [7]	
Botanical Name:	Neolamarckia Cadamba
Family:	Rubiaceae
Botanical Classification:	
Kingdom:	Plantae
Subkingdom:	Trachiobionta
Class:	Asteridae
Order:	Rubiales
Family:	Rubiaceae
Genus:	Neolamarckia F. Bosser
Species:	Neolamarckia cadamba (Roxb)
Vernacular names :	
India	Kadambah and Priyaka Wild Cinchona
Malayalam	Attutekka, Katampu
Hindi	Kadamb, Kadam
Common name	Kadamb, Kadam

Botanical Description : [7]

Bark : Bark is smooth ,dark brown and marked with cracks that is longitudinal.

Leaves: large oval or epileptical . It is as long as about 15-25 cm ,with a bright,shine and also coriaceous.

Flower: Small, yellow and orange colour, numerous in compact.

Figure 1 : Kadam tree with flower

Figure 2: Ripe kadam fruit

Fruit: Fleshy, green when raw and becomes orange when ripe. Seeds are minutes.

Habitat: Tropical regions of India, Thailand ,Malaysia, China. In India it is commonly seen in damp and wet places [8]. It is seen in huge numbers through out the West Bengal and even in Kolkata.

Phytochemical profile and anti oxidant properties:

Alekhya er.al.(2013) estimated the preliminary phytochemicals and in vitro anti oxidant content of leaves and fruit extract of Neolamarckia cadamba by different solvents. The results has shown that this extract contains tanin, saponin, flavonoids and terpenoids. The ethanolic extract of fruit showed significant DPPH radical scavenging activity compared to standard antioxidant [9]. The antioxidant properties of the fruit extract of kadam tree also confirmed by another study on 2013. [10]

Nutritive value of kadam fruit: [11]

Research has shown that it is consumed by most of the tribal people as food but not commonly eaten in urban areas. according to the study conducted by I pal er.al(2014) ,kadam fruit is a rich sources of calcium, iron, magnesium, zinc, and also have considerable amount of CU,P, Se,Cd. It also contains higher level of Ca, Fever, Mg, Zn in compared to other fruits.

Table 1: Mineral content of fruit of Neolamarckia cadamba [11]

Minerals	mg/ 100 gm whole fruit
1.Iron	40.02
2.Calcium	343.7
3.Magnesium	191.7
4.Zinc	2.434
5.Chromium	2.362
6.Copper as Cu	1.344
7.Lead as Pb	0.089
8.Selenium	0.052
9.Phosphorous	0.003
10.Cadmium	ND (DL-0.1 mg/100gm)

ND: Not detected DL: Detection limit

Table 2: Comparison of mineral content of apple, rose apple, pear, water chestnut, dates (as per ICMR Values) with kadam [12]

Fruits	Calcium mg/100 gm	Iron mg/100 gm	Magnesium mg/ 100 gm	Zinc mg/ 100 gm	Copper mg/100 gm	Phosphorous mg/ 100 gm
Apple	10.00	0.66	7.00	0.06	0.10	14.00
Rose apple	10.00	0.50	4.00	-	0.10	30.00
Pear	8.00	0.50	7.00	-	0.40	15.00
Water chestnut	70.00	2.40	72.00	1.56	1.31	440.00
Dates (fresh)	22.00	0.96	12.00	0.03	0.05	38.00
Kadam	**343.70**	**40.02**	**191.70**	**2.43**	**1.34**	**0.003**

Table 3: Macro Nutrient Content in 100 gm Fruit of Neolamarckia cadamba[11]

ANALYSIS	RESULT
Energy Value (Kcal)	56.22
Protein (gm)	2.06
Crude Fat (gm)	0.47
Total Carbohydrates(gm)	10.74
Crude Fibre (gm)	1.06
Total Sugar (gm)	4.67

Table 3 shows the macronutrient analysis of N.cadamba. The calorie content of the fruit is comparatively higher than those of some common edible fruits like guava 51 kcal/100gm fruit, musambi 43 kcal/100 gm fruit, orange 48 kcal/100 gm, ripe papaya 32 kcal/100 gm etc)20. Other macronutrients are more or less same as those of other common fruits. Neolamarckia cadamba fruit contains half amount of calcium that meet the half of the daily requirement of calcium of an adult which is necessary for bone development, transmission of nerve impulses, muscle contraction, blood coagulation and activation of enzymes. It is also beneficial for those who are suffering from calcium deficiency syndrome. [13]

Phosphorus content of its fruit is low.

Iron content is also very higher than normal RDA of adult men and women. Haemoglobin and myoglobin contains iron which helps to transport oxygen. Iron also act as a co factor in the synthesis of steroid hormones, bole acid, collagen,dopamine and serotonin.

Hypochromic microcytic anaemia is also prevented by iron. Therefore kadam fruit can be a option as low cost iron rich food. [13]

Zinc content in this fruit is also very high in compared to other fruits.

Copper is also present in this fruit that is necessary for iron absorption and to in corporate iron in haemoglobin.It is also a part of enzyme superoxide dismutage that prevent oxidative cell damage.Selenium is also present as an anti oxidant. [13]

Table 4: Vitamin Content in 100 gm Fruit of Neolamarckia cadamba [11]

ANALYSIS	RESULT
Ascorbic acid (mg)	16.66±0.1764
Beta carotene (mcg)	23.0366±0.28497

Table 5: Comparison of Ascorbic acid and Beta carotene content of apple, rose apple, pear, dates (as per ICMR Values) with kadam[11] [12]

Fruits	Ascorbic acid (mg)	Beta carotene (mcg)
Apple	1	0
Rose Apple	3	141
Pear	0	28
Dates	3	26
Kadam	**16.6**	**23.03**

Health benefits of kadam fruits

1. Free radical scavenging activity:- According to the research study done by Bhatt et.al. (2017) using the aqueous, methanolic and ethanolic fruit extract of Neolamarckia cadamba reveals that it has higher free radical scavenging activity and also antioxidant activity that protect us from the disease that causes due to free radicals. Also in another study it was found that the ethanolic extract of fruits showed significant DPPH radical scavenging activity compared to standard antioxidant [14].

2. Anti diabetic activity:- According to the study conducted on 2013 the aqueous extract of its fruit revealed that lower serum glucose level, thus has anti diabetic activity [9].

3. Lower serum cholesterol level:- In 2013 a study reveals the extract of the fruits contain alkaloids, lavonoids, tannin, glycosides, phenols, quinines that lower blood LDL cholesterol level [15].

4. Diuretic effect:- According to the study conducted by prathibhakumari et.al(2014) this fruit has higher diuretic activities. The experiment showed that the rat who are consuming fruit extract of 200 mg /kg body weight has a moderate diuretic activity and who are consuming 400mg/kg body weight had a higher diuretic activity compared to that rats who are receiving standard diuretic drug[16].

5. Anti bacterial properties:- Both raw and ripe fruit has shown potential anti bacterial activity against staphylococcus aureus, e coli, pseudomonous aeruginosa [17].

6. Antiurolithitic properties:- Research showed that the aqueous fruit extract of Neolamarckia cadamba and it's supplementation lowered elevated protein, calcium, phosphorus in urine , blood urea, Blood urea nitrogen, uric acid and creatinine in serum [9].

CONCLUSION

Research has shown that kadam fruit are eten as raw by the ethnic people residing in the fringe of the forest to meet their nutritional requirements [18]. But as it is less familiar as a fruit or due to ignorance about its edibility, such a powerhouse of nutrients are neglected and wasted every year. The fruit is easily available, low cost and has been reputed to be used in different food preparation by tribal people.

Hence more research is needed and awareness should be created among people so that they can include this inexpensive fruits in their diet that contribute to the development of

health status of poor people who are suffering from different types of micronutrient deficiencies and also to help indirectly in the economic development of the country.

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