

Quantitative estimation of some essential minerals in the fruit of *Neolamarckia cadamba*

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Abstract: *Neolamarckia cadamba* (Roxb.) Bosser commonly called kadam enjoys a hallowed position in Ayurveda. This study is to make a quantitative estimation of some important minerals like Fe, Ca, Mg, Cr, Pb, Cd, Zn, Se, Cu, and P of the fruit (ripe) of Kadam. The fruit has been reported to be edible. The data obtained from this study show that 100g of the edible portion of the fruit contains 40.02mg Fe, 343.7mg Ca, 191.7mg Mg, 2.434mg Zn, 2.362mg Cr, and 1.344 mg Cu.

Keywords: Ayurveda, Kadam, Iron, Calcium, Magnesium, Zinc, *Neolamarckia cadamba*

I. Introduction

Neolamarckia cadamba also known as kadam, is a tropical tree species that is native to South Asia and Southeast Asia. It belongs to the family of Rubiaceae. The synonyms used for this plant are *Anthocephalus cadamba*, *Anthocephalus indicus*, *Sarcocephalus cadamba* (Roxb.)¹ etc. Kadam is a large tree with a broad umbrella-shaped crown and straight cylindrical bole. The branches are characteristically arranged in tiers. The tree usually reaches a height of 45 m with a stem diameter of 100-160cm².



Kadam flowers



Full bloomed kadam flowers in a tree

The fruitlets are numerous, somewhat fleshy, with their upper parts containing four hollow or solid structures. The fruit occurs in small, fleshy capsules packed closely together to form a fleshy yellow-orange infructescence containing approximately 8000 seeds. The ripe fruits have been reported to be edible in raw state³. The seeds somewhat are trigonal or irregular shaped, not winged².

Phytochemical investigation of different parts of *Neolamarckia cadamba* showed the presence of chemical constituents such as indole alkaloids, terpenoids, saponins, sapogenins, terpenes, steroids, fats, reducing sugar, glycosides, and flavonoids⁴. The isolated principle are glycosidic indole alkaloids; cadambine, 3 α -dihydrocadambine, isodihydrocadambine, and two related non-glycosidic alkaloids. The bark also consists of tannins and an astringent principle; which is due to presence of an acid similar to cincho-tannic acid⁴.

Studies showed that the almost all parts of the plant kadam are used in the treatment of various diseases. Decoction of leaves is used in aphthae or stomatitis, ulcers, wounds⁵. The root and leaf extract of kadam showed hypoglycaemic effect^{6,7}. The bark extracts showed good genoprotective potential comparable to gallic acid. The flower extract of kadam showed a marked increase in serum levels of aspartate transaminase (AST), alkaline phosphatase (ALP), glutamate pyruvate transaminase activity (GPT) and total bilirubin, and reduction of superoxide dismutase, catalase levels in liver⁸.



Ripe kadam fruit



Cross section of a ripe kadam fruit

The fruits showed significant antibacterial activity against different microorganisms and especially good result against *E. coli*⁹. Green fruit also exerts wound healing and antioxidant property because of terpenoids. Ripened fruit is a better wound healer and a traditional remedy for urinary tract problems because of the presence of tannins along with terpenoids¹⁰.

It has been reported that the ripe fruits are edible in raw state³. But there is no evidence of any research work on the nutritive values of the fruit of *Neolamarckia cadamba*.

II. Materials And Methods

2.1 Collection of the sample

Kadam fruits were collected from the adjacent garden of Department of Home science campus, University of Calcutta.

2.2 Preparation of sample

The ripe whole fruit was selected as the test portion for the quantitative estimation of the minerals.

2.2 Preparation of working solution

The working solution was prepared for measuring the following minerals Fe, Ca, Mg, Zn, Cr, Cu, Pb, Se, P, Cd using AOAC method.¹¹ The instrument used for mineral estimation was ICP (OES), model ICAP6800, serial number ICP 20073108, calibrated with NIST certified multi-standards.

III. Results

Table 1: Mineral content of fruit of *Neolamarckia cadamba*

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

This table shows a considerable amount of Iron, Calcium and Magnesium content in the fruit of *Neolamarckia cadamba*.

Table 2: Comparison of mineral content of apple, rose apple, pear, water chestnut, dates (as per ICMR Values)¹² with kadam (obtained in this study)

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-2 shows that kadam fruit is an excellent source of Ca, Fe, Mg, Zn as compared to our popular fruits like apple, rose apple, pear, water chestnut and dates.

IV. Discussion

From this it may be concluded that kadam fruit is a rich source of Ca, Fe, Mg, Zn and also have considerable amount of Cu, P, Se, Cd are low. Furthermore the fruit contains higher amount of Ca, Fe, Mg, Zn in comparison to some commonly edible fruits.

Thus kadam fruit is a good source of important minerals, and can be placed at par with some well known and expensive fruits like apple, pear etc in terms of their mineral content. However, being unfamiliar as a fruit or ignorance about its edibility, such a rich resource of minerals has remained neglected. The fruit is therefore an easily available source of nutrients and inexpensive and has been reported to be used in different food preparations by tribal people. Hence, it may be promoted among economically backward sections of people who are not able to procure the more expensive fruits.

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