

KADALI PUSHPA (*Musa paradisiaca* Linn.) – BLOSSOMS OF AYURVEDA

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ABSTRACT

Kadali Pushpa (Banana Flower) has been mentioned in almost all Nighantus (Lexicons). Ethnomedicinally used as a tonic for female disorders like Menorrhagia, Abnormal Uterine Bleeding and Urinary Calculi etc. *Musa paradisiaca* Linn. belongs to Musaceae. Inflorescence in Musaceae indicates death of the plant, aptly called as ‘Mrtyu Pushpa’ in Kaiyadeva Nighantu. Banana although a highest grossing fruit crop in India, its flower’s medicinal use is still in dark. Thus to understand a melange of properties of Kadali Pushpa the current article reviews on Ayurveda literature, Botanical description, Varieties and Powder Microscopy.

KEYWORDS: Kadali Pushpa, *Musa paradisiaca*, Ayurveda

INTRODUCTION

Kadali Pushpa posses Yoni Doshahara karma and is Asraghni (checks excess menstrual bleeding)¹, Kadali also being mentioned in Rodhradhi Gana^{2,3} confirms its Yonidosha-hara action. Although mentioned in Samhitas and Nighantus, its therapeutic actions are not sufficient. Banana (*Musa paradisiaca*. Linn) occupies 20% area among the total area under crop in India⁴. The ratio of Banana waste and Produce is 2:1⁴, which encompasses the flowers as waste product too. Hence maximum utilisation of a medicinal drug, which is also easily available, should be done through proper research. An attempt has been made in current article to review **GANA/VARGA**^{1,2,3,6,7,8,9,10,11,12}:

on Ayurveda literature, Botanical description, Varieties and Powder Microscopy pertaining to Kadali Pushpa.

**AYURVEDA LITERARY REVIEW:
ONOMATOLOGY⁵:**

The word ‘Kadali’ comes from Root ‘*Kadi Ahvane Rodane cha*’, meaning that which is Inviting, also meaning that which secretes water.

Another Root being ‘*Dal Visharane*’, meaning that which oozes

SYNONYMNS OF KADALI PUSHPA¹

Brhat Puspa (Large inflorescence)
Mrtyu Pushpa (Inflorescence indicating death of Plant)

Reference	Gana/Varga
Charaka Samhita	Phala Varga
Sushruta Samhita	Lodhradhi Varga
Ashtanga Hridaya	Rodhradi Varga

Dhanvantari Nighantu	Karaveeradi Varga
Kaiyadeva Nighantu	Aushadhi Varga
Raja Nighantu	Amradi Phala Varga
Bhavaprakasha Nighantu	Amradi Phala Varga and Shaaka Varga (Kadali Pushpa is mentioned as Pushpa Shaaka)
Nighantu Adarsha	Kadalyadi Varga
Madanapala Nighantu	Phaladi Varga
Priya Nighantu	Hareetakyadi Varga
Shodala Nighantu	Karaveeradi Varga
Sousruta Nighantu	Lodhradi Varga

VARIETIES:

Kadali Bheda^{11,12}:

Bhava Prakasha Nighantu: Manikya Kadali, Martya Kadali, Amruta Kadali and Campaka Kadali are 4 types of Kadali mentioned.

Raja Nighantu: Considers 3 types, they are Kaasta Kadali, Giri Kadali and Suvarna Kadali.

RASAPANCHAKA:

Kadali Pushpa:

According to Kaiyadeva Nighantu¹ -

Rasa - Tikta-Kashaya

Veerya- Ushna

Doshagnata - Kaphanaashaka

Karma - Grahi, Deepana, Balavardhaka, Yonidoshara, Asraghani.

FORMULATIONS:

Kadalyadi Ghrita (Kadali Pushpa)¹³

TAXONOMICAL CLASIFICATION¹⁴:

Kingdom	Plantae
Sub Division	Tracheobionta
Division	Mangoliphyta
Class	Liliopsida
Subclass	Zingiberidae
Order	Zingiberales
Family	Musaceae
Genus	Musa
Species	Paradisiaca

VERNACULAR NAMES¹⁵:

Kannada: Bale

English: Banana

Tamil: Vazhai

Telagu: Arati

Malayalam: Vazha

Hindi: Kela

Urdu: Kela

Trade: Banana

BOTANICAL DESCRIPTIONS^{16,17}:

Habit: Gigantic monocarpic perennial herb.

Infloroscence: It is branched spadix. The flowers are protected by large, brightly coloured, spirally arranged, boat shaped bracts called spathes. When the flowers open, the spathes roll back and finally fall off.

Flowers: Bracteate, ebractiolate, sessile, trimerous, unisexual or bisexual, when unisexual, the flowers are monoecious. The flowers are zygomorphic and epigynous.

Perianth: Tepals 6, arranged in two whorls of 3 each. The three tepals of the outer whorl and the two lateral tepals of the inner whorl are fused by valvate aestivation to form 5 toothed tubes like structure. The inner posterior tepal is alone free. It is distinctly broad and membranous.

Androeceium: Stamens 6, two whorls of 3 each, arranged opposite to the tepals. Only 5

stammens ae fertile and the inner posterior stamen is either absent or represented by a staminode. Anthers are dithecous and they dehisce by vertical slits. The filament is filiform and rudimentary ovary or pistillode is often present in the male flower.

Gynoecium: Ovary inferior, tricarpellary, syncarpous, trilocular, numerous ovules on axile placentation. The style is simple and filiform. The stigma is three lobed.

VARIETIES:

The World Checklist of Selected Plant Families accepts 68 species and two primary hybrids, as of January 2013¹⁸. Taxa of *Musa paradisiaca Linn.* grown in Karnataka are enlisted below¹⁹.

Karnataka	Varities grown
	Elakki Bale (Ney Poovan)
	Grande Naine
	Robusta
	Hoo Bale
	Karibale (Monthan)
	Jwaribale (Pome)
	Boodi Bale
	Maduranga
	Nendra Bale
	Chandra Bale(Red Banana)
	Nanjangud Rasa Bale (Silk)

PHARMACOGNOSY²⁰:

Macroscopic Characteristics:

Bract: Bracts are large opening in succession, ovate, 15-20 cm in length width at base is 6.6 cm, in middle 9cm , concave, dark red /dark brown in color and fleshy.each bunch contain 13-17 bracts before the end of stalk.

Flower: Group of flowers is arranged radially on flowering stalk and covered by a bract. About 11-13 flowers are produced per cluster that are covered by bract and are

individually attach with base. Each flower covering contain 5 small flowers and one large flower. Each flower has 7.3-7.8 cm length.

Floral stalk: Trachea is 16-17 inch in length and 4-6 cm in width, approximately round in shape with points of opening of bracts.

Microscopic Characteristics:

Bract: It reveals the presence of Spiral vessels with Phloem Fibres, Blackish-Brown pigmented thick walled cells with spiral vessel and epidermal tissues with Stomata, Epidermal tissues with lateral view and Epidermal cells with mesophyll tissues containing chloroplastid. Fibro-vascular tissues, parenchymatous tissues, Groups of Sclerids, Bundle of simple Phloem fibres, Calcium oxalate Crystals, Nonglandular trichomes and Part of annual vessels along with group of Xylem Fibres are also present.

Flower: Powder of flower contains Fibro-vascular tissues, Groups of pigmented lignified cells containing Starch Grains, Epidermal tissues with stoma, Prism like Calcium oxalate Crystals, and Spherical Pollen Grains. Pigmented and non pigmented Sclerids, Glandular Trichomes, Parenchyma of Floral Stalk and epidermal tissue with Surface view are also present.

Floral stalk: Prism like Calcium oxalate crystals, Fragments of xylem fibres, Groups of thick walled sclerenchyma and Thick-walled Parenchyma containing Calcium oxalate crystals are present. Powder also contains Thick-walled parenchyma with simple trichome, Sieve tube with Phloem Parenchyma, Fragments of Sieve tubes, Spiral Vessels and thin walled Pigmented Sclerids.

Powder Microscopy:

Musa paradisiaca Linn.

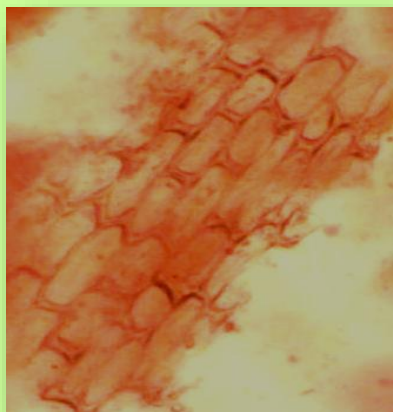
Powder:

Dark brown Green in colour, Rough to touch, Smell agreeable, Bitter in taste.

Procedure: Treated with chloral hydrate and water observed under the microscope following different fragments of tissues were observed.

- i) Parenchymatous cells
- ii) Groups of fibers
- iii) Epidermal Parenchymatous cells with tannin cells and oil globules.
- iv) Helical to spiral xylem vessels.
- v) Raphide bundles Showing acicular crystals.
- vi) Tannin containing cells.

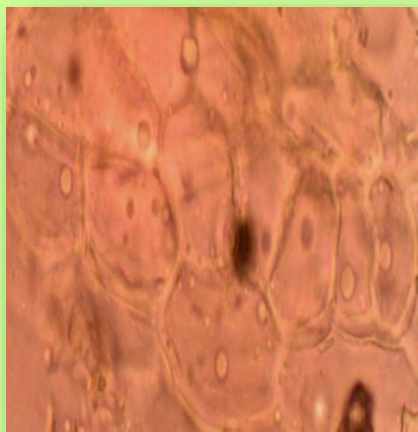
Images of *Musa paradisiaca Linn.* Powder Microscopy



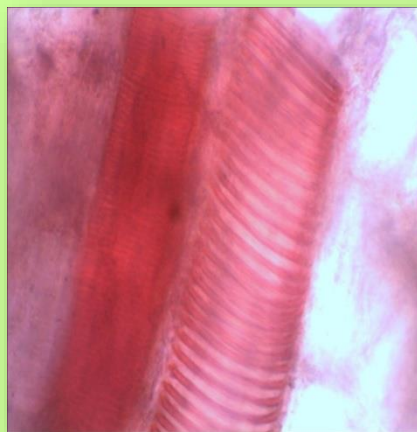
Parenchymatous cells. 10X x 40X



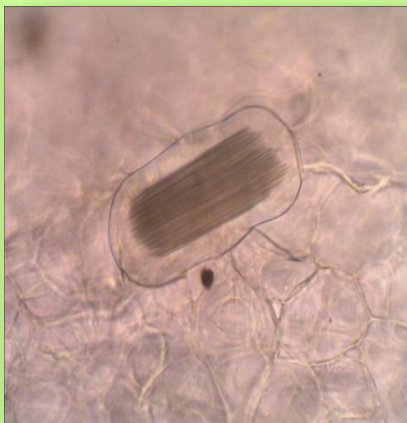
Groups of fibers. 10X x 10 X



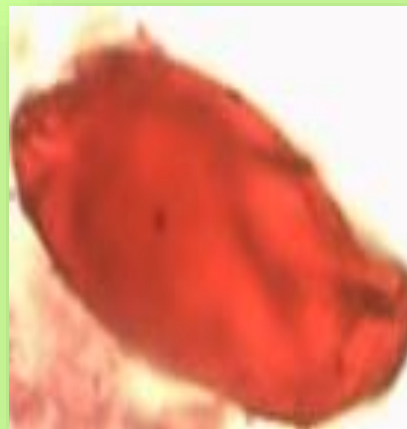
Epidermal Parenchymatous cells with tannin cells and oil globules. 10X x 40X



Helical to spiral xylem vessels 10x x 40 x



Raphide bundles Showing acicular crystals.
10x x 40X



Tannin containing cells. 10Xx 40 X

CHEMICAL CONSTITUENTS²¹:

Bract – Alkaloids, Saponins, Glycosides, Tannins.

Floret – Alkaloids, Saponins, Glycosides, Tannins, Flavanoids, Terpenoids.

TOXICITY²² :

Brine shrimp toxicity test performed on *Artemia salina* proves that banana flower extract is not toxic and the LC50 value obtained was 9.97 mg/ml above the cut-off point of toxicity level 1.0 mg/ml.

PHARMACOLOGICAL ACTIVITY BASED ON RESEARCHES:

Haemostatic effect of *Musa paradisiaca*. Linn stem juice was evaluated in Guinea Pigs considering Bleeding and Clotting time. Results were significant statistically²³.

In Vitro Bioactivity test of *Musa acuminata* Flower suggest antioxidant activity and Antimicrobial activity against tested microorganisms like *Staphylococcus aureus*, *Proteus mirabilis*, *Bacillus subtilis*, *Candida albicans* *Micrococcus sp*, *Salmonella sp* and *Apergillus niger*²³.

Molecular docking studies of *Musa sapientum* Flower flavonoids as Insulin Receptor Tyrosine Kinase activators as a

cure for diabetes mellitus suggests Banana flower flavanoids can be considered as activators of Insulin Receptor Tyrosine kinase and a potential cure in Diabetes mellitus²⁴.

Anticancer property of anthocyanin extracts from *Musa acuminata* bract was evaluated. Anthocyanins have potent anticarcinogenic property against several cancers. Chemo preventive effects of anthocyanin extracted from *Musa acuminata* bract against human breast cancer cell line (MCF-7) were evaluated. This study suggested that anthocyanins from *Musa acuminata* bract extracts have strong anti-proliferative activity against MCF-7 cell lines at varying concentrations²⁵.

DISCUSSION AND CONCLUSION:

Kadali Pushpa (Banana Flower) is an abundantly available medicinal drug. Kadali Phala (Banana), Kadali Kanda (Banana Stem), Kadali Kshara (Plant Alkali) is widely used in treatment. Usage of Kadali Pushpa in treatment will not only ensure benefits therapeutically but also in conservation of nature by using a drug which is discarded as a bio waste.

Yonidoshahara and Asraghni property can be efficiently used in Female disorders. Although not many yogas or application of Kadali pushpa is found in Classical texts. Hence researches are to be carried out to test the efficacy of Kadali Pushpa clinically, also as it is a Shaka Dravya (Vegetable)^{1,12} it is compatible to the body and can be more effective.

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Source of support: Nil,
Conflict of interest: None Declared

Cite this article as

Amulya Kannan : Kadali Pushpa (*Musa Paradisiaca* Linn.) – Blossoms of Ayurveda; ayurpub; IV(4): 1297-1304

Images of *Musa paradisiaca* Linn.



Musa paradisiaca Inflorescence



Musa paradisiaca Inflorescence



Musa paradisiaca Bract & Florets



Musa paradisiaca Florets



Musa paradisiaca.Linn Plant



Musa paradisiaca.Linn Plant