



**TAXONOMIC STUDY OF LEGUMINOUS PLANTS WITH THEIR CHEMICAL COMPOSITION,
GROWING IN KAMLA NEHRU ZOOLOGICAL GARDEN, AHMEDABAD, GUJARAT, INDIA**

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ABSTRACT

Kamla Nehru Zoological Garden was established by Rueben David in 1951 CE spread over 21 acres. It was rated the best zoo in Asia in 1974. They are 450 mammals, 2,000 birds, 140 reptiles in a 31 acre zoo. It is a treasure of wild animals like tigers, lions, python, anaconda, snakes, elephant, albinos (white), like the rhesus monkey and peacock, spotted deer, white blackbuck, chinkara, elephants, emu, jungle babbler, bush-quail and common palm civet. Kankaria Zoo has also records in breeding of rare species in Zoo like pythons, crocodiles, bearcats and wild asses. Reuben David was awarded Padma Shri in 1974 for it. A total of 10 sp. were recorded from the study area. The major species like *Calliandra haematocephala*, *Prosopis juliflora*, *Dalbergia sissoo*, *Derris indica*, *Bauhinia purpurea*, *Cassia siamea*, *Bauhinia racemosa*, *Cassia fistula*, *Delonix regia*, *Peltophorum pterocarpum* Reported from the study area.

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INTRODUCTION

Natural resources survey like floristic study plays an important role in the economic development of developing country like India. Vegetation is the most precious gift, nature has provided to us as meeting all kinds of essential requirements of the humans in the form of food, fodder, fuel, medicine, timber, resins, and oil, etc. Plant communities play a pivotal role in sustainable management by maintaining biodiversity and conserving the environment. Floristic study and diversity assessments are necessary to understand the present diversity status and conservation of biodiversity. Floristic study is a necessary prerequisite for much fundamental research in tropical community ecology, such as modeling patterns of species diversity or understanding species distributions. Floristic studies acquire increasing importance in recent years in response to the need of developing and under developing countries to assess their plant wealth. Many floristic diversity studies have been conducted in different parts of world. Thus, it is clear that floristic studies are undertaken by many researchers worldwide in different levels. Floristic explorations and taxonomic studies can provide efficient and convenient information about the nomenclature, distribution, ecology, utility of various plant species, and thus about an ecosystem. Taxonomy is an integrated and, perhaps, intuitive science of identifying, naming and classifying plants.

This may be considered as the oldest of sciences in the world, as the primitive man had to distinguish the plants that he can eat safely, from those which are poisonous and inedible. Now there is great revival for this subject in view of the alarming erosion of species and ecosystems. It was estimated that around more than 7000 species of organisms are becoming extinct every year and many of them disappear even before known to the scientific world. Thus, conservation of biodiversity has gained prime consideration all over the world since the Earth Summit at Rio de Janeiro in 1992. It is estimated that tropical forest harbor about 70% of living organisms of the whole world, of which roughly 20% of the total are confined as exclusive endemics in 18 areas throughout the tropical forests (Myers, 1988).

MATERIALS AND METHOD

Frequent trips were made to every region during 2015-16 by various field trips. The identification of plants was done with the help of flora (Cooke 1968 and Shah 1978) and plants were recorded. Photographs of some plant sp. were also taken during the field trip. The plants were recorded and arranged according to the Bentham & Hookers classification system.

RESULTS AND DISCUSSION

During the present research work different area of Kankaria Zoo and adjoining place were frequently visited and specimen were collected and identified with the help of literature and flora. Field note were also given below. A total of 10 sp. were recorded from the study area.

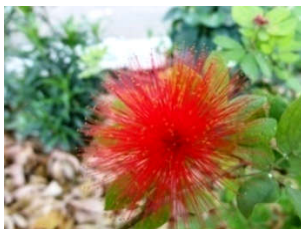
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The major species like *Calliandra haematocephala*, *Prosopis juliflora*, *Dalbergia sissoo*, *Derris indica*, *Bauhinia purpurea*, *Cassia siamea*, *Bauhinia racemosa*, *Cassia fistula*, *Delonix regia*, *Peltophorum pterocarpum* Reported from the study area.

Enumeration of the plants

Red Calliandra



Botanical name: *Calliandra haematocephala* Hassk.
Family: MIMOSACEAE

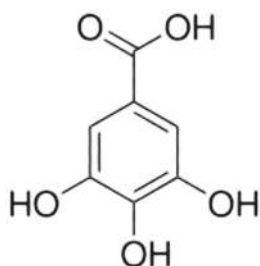
Taxonomical Description

Small, perennial, thornless leguminous tree 10 ft (3 m) or more if not pruned back; grows to 6 ft (1.8 m) with white-reddish brown bark. Leaves are bipinnate and alternate; the rachis is 10-19 cm long, without glands; pinnae are (3-) 6-20 jugate, rachilla are 2-11 cm long; there are 19-60 pairs of leaflets; leaflets are linear, oblong and acute, 5-8 mm x 1 mm. Inflorescences are particulate with flowers in umbelliform clusters, 10-30 cm long. Flower sepals and petals are green, calyx 2 mm long, corolla 5-6 mm long. The numerous red staminal filaments are 4-6 cm long. Fruits are broadly linear, flattened, 8-11 cm x 1.0 cm with thickened and raised margins, finely pubescent or glabrous, brown dehiscent, 8- (-12) seeded. Seeds are ellipsoid, flattened, 5-7 mm long and mottled dark brown.

Chemical Composition

1. Alkaloids
2. Tannins
3. Cardiac glycosides
4. Saponins
5. Flavonoids

Chemical Structure of Tannins:-



Prosopis



Botanical name: *Prosopis juliflora* (Sw.) DC.

Family: MIMOSACEAE

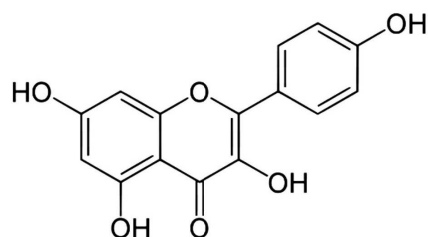
Taxonomical Description

Prosopis juliflora is a shrub or small tree. It grows to a height of up to 12 metres (39 ft) and has a trunk with a diameter of up to 1.2 metres (3.9 ft). Its leaves are deciduous, bi-pinnate, light green, compounded with 12 to 20 leaflets. Flowers shortly after leaf development. The flowers are in 5–10 cms. long green-yellow cylindrical spikes, which occur in clusters of 2 to 5 at the ends of branches. Pods are 20 to 30 cms. long and contain between 10 and 30 seeds per pod. A mature plant can produce hundreds of thousands of seeds. Seeds remain viable for up to 10 years. The tree reproduces by way of seeds, not vegetatively. Seeds are spread by cattle and other animals that consume the seed pods and spread the seeds in their droppings.

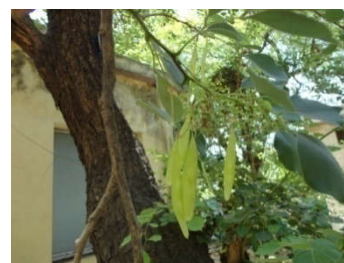
Chemical Composition

1. Flavonoids-flavones –apigenin
2. Luteolin
3. Kaempferol
4. Alkaloids-Juliflorine-Julifloricine

Chemical Structure of Kaempferol:-



Motosisam



Botanical name: *Dalbergia sissoo* Roxb.

Family: PAPILIONACEAE

Fls. & Frs.: Jan.-Oct.

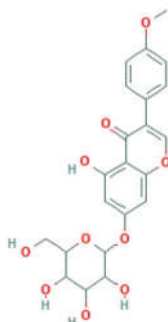
Taxonomical Description

Tree up to 10 m tall. Bark thick, light-brown, longitudinally furrowed. Leaves imparipinnate, leaflets 3-5, 1.2-2.5 x 0.5-5.7 cm broadly-ovate, suborbicular, base cuneate, leaf rachis zigzag, terminal largest and lowest smallest, alternate, base narrowed. Flowers in axillary panicles. Calyx campanulate, teeth short, ciliate. Corolla pale-yellow, standard broad, limb obovate-orbicular. Stamens 9, monadelphous in one bundle. Pods 5.0-6.7 x 0.9-1.2 cm, lanceolate, glabrous, reticulate, narrowed at base. Seeds 1-4 brownish, subreniform, glabrous.

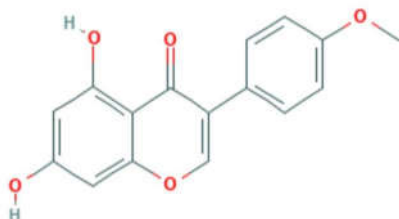
Chemical Composition

1. Leaves :- Sissotrin, Isoflavone, Glycoside
2. Heart wood :- Dalberin, Nordalbergenonls, Biochanin-a & Allylphenol of latifolin, Fixed oil, Essential oil, (Bisabolene & Nerolidol)

Chemical Structure of Sissotrin:-



Chemical Structure of Biochanin A:-



Karanj



Botanical name

Derris indica (Lam.) Bennet Syn. *Pongamia pinnata* (L.) Pierre.

Family: PAPILIONACEAE

Fls. & Frs.: Feb.-July.

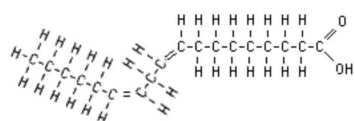
Taxonomical Description

Trees upto 7-15 m tall. Bark grayish-white, rough. Leaves imparipinnate, leaflets 5-9, 6.0-8.4 x 4.1-5.2 cm, coriaceous, broadly ovate or ovate-oblong, acute, stipules oblong. Petioles 2.8-3.3 cm long. Flowers white or purplish, in axillary racemes. Calyx campanulate, truncate. Corolla pinkish-white, standard suborbicular, emarginated, claw very short. Stamens 10, monadelphous, anthers versatile. Pods 3.8- 4.9 x 1.7-1.9 cm thick elliptic-oblong, compressed, glabrous, smooth, obliquely, woody. Seeds oblong or slightly reniform, brown, rugose.

Chemical Composition

28% - 34% fixed oil with high % of polyunsaturated fatty acids.

» Chemical Structure of :- Polyunsaturated fatty acids



Linoleic acid, a polyunsaturated fatty acid. Both double bonds are *cis*.

Kanchnar



Botanical name: *Bauhinia purpurea* L.

Family: CAESALPINIACEAE

Fls. & Frs.: Sep.-Feb.

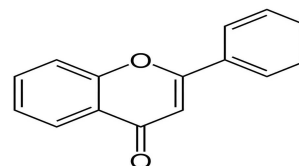
Taxonomical Description

6-10 m tall, trees. Bark, grey, or dark-brown. Leaves suborbicular, coriaceous, deeply lobed cordate base, petiolate. Flowers 3-8 cm across, in 5-12 cm long, terminal racemes. Pods 20-25 x 2-2.5 cm linear flat, apiculate, reddish-brown, woody pendent. Seeds globose, smooth, glabrous.

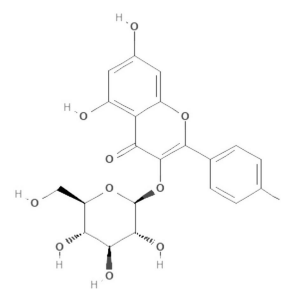
Chemical Composition

1. Heart wood:- Steroids, Triterpenoids, Flavonoids.
2. Flowers:- Astragalin, Boqueretin, Pelargonidin, Triglycoside, Butein, Galactoside.
3. Bark:- Tannic acid, Glucose and Gum.
4. Seeds:- Alkaloids, Trypsin, Chymotrypsin inhibitors, Chalcone glycosides

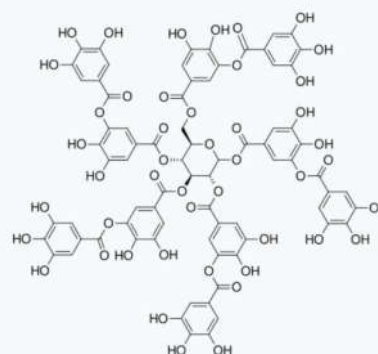
Chemical Structure of Flavonoids



Structure of Astrgalin



Tannic acid



Kassid Tree



Botanical name: *Cassia siamea* Lam.

Family: CAESALPINIACEAE

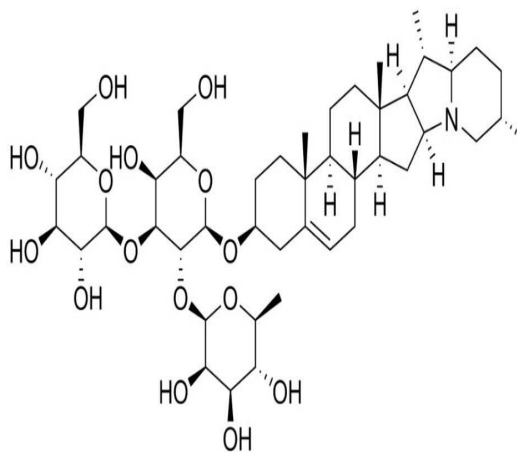
Taxonomical Description

Medium size tree grows up to 18 m. It is often used as shade tree. *Cassia siamea* is a medium sized evergreen tree having a great many branches. The leaves are arranged in cascades and the yellow flowers hang in bunches not unlike grapes. The tree grows under humid conditions but does not prefer waterlogging. Flowering occurs from June to January. It can be used for avenue plantation.

Chemical Composition

1. Alkaloids
2. Saponin
3. Anthraquinone,
4. Tannins
5. Phlobatannins
6. β -Sitosterol
7. Cassiamin-A
8. Phycion
9. Chrysophenol
10. p- Coumaric acid
11. Thaliction

Chemical Structure of Saponin:-



Kasotri, Asotri



Botanical name: *Bauhinia racemosa* Lam.

Family: CAESALPINIACEAE

Fls: Jan.-June **Frs:** Throughout the year.

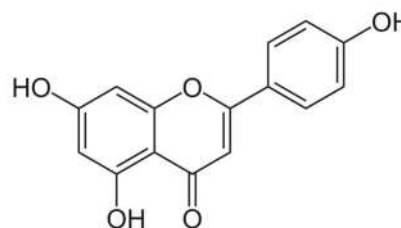
Taxonomical Description

Deciduous trees upto 3-5 m tall. Bark dark brown, rough, longitudinally fissured. Leaves broader than long 3.5-6.9 x 3.0-8.4 cm green, tomentose, base cordate, petiolate; Petioles 1.0-1.6 cm long. Flower creamy-yellow, in terminal or leaf-opposed, racemes, bracts, linear, acute. Calyx pubescent, spathaceous. Corolla obovate-spathulate, yellow, narrowly oblanceolate. Stamens 10, all fertile, filaments hairy at base. Pods stalked 6.5-8.8 cm, linear-oblong, woody, slightly curved, dark-brown. Seeds oblong compressed, glabrous, brown.

Chemical Composition

1. Alkaloids
2. Apigenin
3. Carbohydrates
4. Quorcetin
5. Flavonoids
6. Glycosides
7. Protein
8. Rutin steroids

Structure of Apigenin:-



Garmalo



Botanical name: *Cassia fistula* L.

Family: CAESALPINIACEAE

Fls.: Mar.-June

Frs.: Throughout the year.

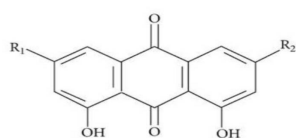
Taxonomical Description

6-10 m tall, deciduous trees. Bark dark-brown and rough in older parts. Leaves paripinnate, 20-45 cm long leaflets 4-8 pairs, 8-20 x 3.0-8.5 cm, ovate or elliptic-ovate, acute, obtuse, petiolates 2.0-5.0 cm long, glabrous. Flowers bright to golden yellow, in 19.0-27.5 cm long lax racemes, drooping. Calyx imbricate, oblong. Petals 5 yellow, obovate, subequal, clawed. Stamens 10, longest 3 are much curled and bear large, oblong, much curved anthers, the 4 median. Stamens straight and 3 remaining very short and erect staminodes. Pods 35-40 cm long, dark blackish-brown with faint horizontal veins. Seeds ovate or ellipsoidal, glabrous, smooth.

Chemical Composition

1. Anthraquinone glycosides
2. Flavonoids

Structure of Anthraquinone glycosides



Aloe-emodin: R₁ = CH₂OH; R₂ = H
 Chrysophanol: R₁ = CH₃; R₂ = H
 Emodin: R₁ = CH₃; R₂ = OH
 Rhein: R₁ = COOH; R₂ = H
 Physcion: R₁ = CH₃; R₂ = OCH₃

Gulmahor



Botanical name : *Delonix regia* (Boj.) Raf.

Syn. *Poinciana regia* Boj.

Family: CAESALPINIACEAE

Fls. : Jan.-May **Frs. :** June-Dec.

Taxonomical Description

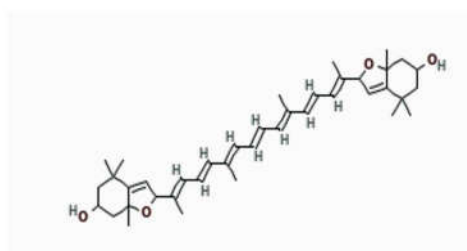
7-12 m tall deciduous trees, with grey to pale-brown bark. Leaves 8-30 cm long, pinnae 8-20 pairs leaflets 12-30 pairs, 0.8-1 x 0.4-0.5 cm, oblong, glabrous or nearly so. Flowers 4.5-5.5 cm across in 8-20 cm long terminal, simple or branched racemes. Pods 30-40 x 3-4 cm, broadly linear, woody dark-brown or reddish-brown flat, beaked. seeds oblong, glabrous smooth, white or creamy-white, mottled brown.

Chemical Composition

1. Tannin
2. Saponin
3. Phenolic glycosides
4. Auroxanthin
5. Mutatochrome
6. Pyruvic acid
7. Lupeol

8. Epilupeol
9. β- Sitosterol
10. Stigmasterol
11. p- methoxybenzaldehyde

Structure of Auroxanthin:-



Tamrafali



Botanical name

***Peltophorum pterocarpum* (DC.) Backer. ex k.**

Family: CAESALPINIACEAE

Fls. & Frs.: Throughout the year.

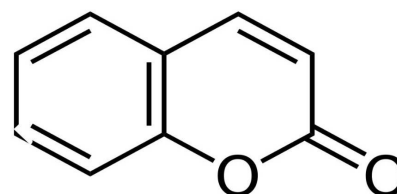
Taxonomical Description

5-16 m tall, green trees, younger parts rusty-brown or grayish tomentose. Leaves 12-30 cm long alternate pinnae 6-13 pairs leaflets 6-17 pairs. 0.6-2 x 0.3-0.8 cm, oblong glabrous. Flowers bright-yellow in 10-32 cm long terminals and axillary reddish-brown panicles. Pods 5-10 x 1.6-2.2 cm, lanceolate, dark-brown, woody, seeds obovate-oblong, compressed, smooth, glabrous

Chemical Composition

1. Phenolic compounds
2. Flavonoids
3. Saponin
4. Steroids
5. Tannins
6. Xanthoproteins
7. Coumarins
8. Cycloisocoumarins
9. Panosins
10. Epiglobulol
11. Jatamanone
12. β- Sitosterols

Chemical Structure of Coumarin



Acknowledgement

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