CHAPTER 2

Review of literature
In the recent past significant work has been done in relation with the morphological, anatomical, phytochemical and pharmacognostical aspects of medicinally important plants. Turrel (1934) for the first time claimed that morphological features of the leaf should not be neglected as it helps in the identification as well as in the classification of different taxa. Lee (1948) supported the claims of Turrel and put forward a system for identification of leaf. Datta and Datta (1952) have worked out morphological details of the leaves of _Eucalyptus globulus_ Labill. Janik and Kubackova (1963) and Argus (1965) have given details of the leaf anatomy of _Salix herbacea_ Linn. and of the _Salix glauca_ complex respectively. Fischer (1885) for the first time studied extensively the histology of the vein-endings in dicotyledons and paid more attention to the nature of phloem in them. In _Mouriria_, the xylem in the vein-endings was reported by Foster, (1947).

Qadry and Hamid (1962) have studied the pharmacognostical aspects on the stem and leaf of _Zanthoxylum alatum_ Roxb. Jolly (1966) has studied the pharmacognostical aspects on the stem bark of _Soymida febrifuga_ A. Juss. which revealed that, when the drug analysed for its ash values, gave 16.36% of total ash, 1.5% water soluble ash, 0.23% of acid insoluble and 23.04% of sulphated ash. Similarly, the ash values of different barks and leaves were studied from pharmacognostical point of view in different plants e. g. _Adhatoda vasica_ Nees. (Prasad and Prabhu, 1950) and _Abroma augusta_ Linn. (Mitra and Prasad, 1971). The extractive value of the bark of _Albizzia procera_ (Roxb.) Benth. was studied by Gupta and Kapoor (1974) and found the water-soluble extractives = 43.41% and alcohol soluble extractive = 38.06%. Similarly, the extractive values were recorded in different plants e. g. _Soymida febrifuga_ A. Jass. (Jolly, 1966) and _Echinops echinatus_ Roxb. (Ahmad et al., 1979).
Fluorescence analysis of the powdered bark of *Albizia lebbeck* (L.) Benth. under Ultra Violet light was done by Shah and Bhattacharya (1960) and they found that petroleum ether, alcohol, benzene extracts of the bark exhibited pale blue, bluish violet and yellowish green fluorescence respectively. Similar studies were conducted in *Terminalia arjuna* (Roxb.) Wight & Arm. and *T. tomentosa* Linn. (Shah and Mehta, 1956).

In phytochemical screening of 202 plants belonging to 162 genera distributed over 64 natural orders, presence of alkaloids, saponins, sterols, terpenes and tannins etc., had been observed by Maiti (1968). Shah et al. (1968) during the phytochemical studies of *Cassia tora* Linn. and *Cassia occidentalis* Linn. had reported Chrysophanol, aloe-emodine, rhein and emodine in the leaves. Atal and Banga (1962) showed the presence of two alkaloids in the stem of *Piper longum* Linn. Kubackova and Prauzkove (1963) had reported the chemistry and morphology of rarely utilized wood of *Salix alba* Linn. Thieme (1968) had also studied the isolation and elucidation of a new flavonol glucoside from the leaves of *Salix alba*. Similar phytochemical screening was done in other plants also e.g. *Tabernaemontana coronaria* R. Br. (Udayasankar, 1972) *Cassia alata* Linn. (Seshagirirao, 1973) and *Taxus baccata* Linn. (Khan et al., 1976). The chemical investigation on some Indian medicinal plants have also been done in past by Mitra and Kapoor (1975), Afaq (1978), Kumar (1979), Shamsi (1979), Khan (1981a) and Khan (1981b).

In Pharmacognostical studies the macroscopic and microscopic characters of the stem bark of different tree species have been described e. g. *Ficus lacor* Buch.-Ham. (Mitra and Kapoor, 1975), *Bauhinia variegata* Linn. (Prakash et al., 1978).

Several researcher have described the macroscopic and microscopic characters of leaves during the course of pharmacognostical studies of different medicinally important species e. g. *Tinospora*
**Acacia leucophloea** (Roxb.) Willd. (Mimosaceae)

**Distribution:**

*Acacia leucophloea* is distributed in Mayamnar, Malaya and Ceylon. The plant is well represented in India particularly in Punjab, Central India, Andhra Pradesh, Karnataka and the dry forest tracts of peninsular India. It is found throughout Rajasthan but grows well in Jaisalmer, Bikaner, Jodhpur, Jaipur, Udaipur and Kota division and also in the dry zones of the country and Ceylon. It commonly occurs in wastelands and open forests (Hooker, 1979; Naithani, 1985; Shetty and Singh, 1987; Maheshwari, 1997).
Botanical description:

*A. leucophloea* is a small or medium sized, deciduous tree up to 6-8 meter in height. The bark is white grey to nearly white outside and light red inside, smooth and exfoliates in irregular scales. The stem is crooked. Stipular spines in pairs, up to 2.5 cm long, straight. Pinnac 5-12 pairs, with concave glands in between. Leaflets 10-30 pairs, sessile, linear, crowded about 5x1 mm. Flower heads small, pale yellow, sweet-scented, in large, terminal, leafless, densely tomentose panicles. Pods 10-15 X 0.6-1 cm narrowly ligulate, with persistent, pale brown tomentose, velvety when young, 10 to 20 seeded, obliquely septate between the seeds. The flowering takes place during September to October and fruiting November to February (Duthie, 1960; Hooker, 1979; Shetty and Singh, 1987; Anonymous, 1985a; Kirtikar and Basu, 1993; Maheshwari, 1997).

Medicinal properties and uses:

*A. leucophloea* is a medicinal and ornamental plant (Muragesan et al., 1997). The plant has been described to be highly medicinal having astringent, demulcent, aphrodisiac and antisyphilitic properties (Nadkarni, 1978; Anonymous, 1985b; Chopra et al., 1996). It has been found to possess antibacterial (Srivastava and Agnihotri, 1984) and juvenomimetic activities. The bark is also crushed and applied in bandage over the traumatic ulcer. The speciality of this medicine is that even if the ulcer gets moisture, the curing process does not get retarded and no pus is formed. Its bark is reported to be bitter, cooling, acrid, alexiteric, anthelmintic, antipyretic, cures inflammations, bronchitis, leprosy and useful in biliousness, thirst, vomiting, burning sensation and diseases of the blood (Kirtikar and Basu, 1993; Anonymous, 1985b). The bark is used in the preparation of spirit from palm juice and sugar. It is reported to act as a clarifying and flavouring agent (Anonymous, 1985b). Leaves are used in syphilis (Chopra et al., 1996).
The medicinal uses and chemical composition of *Acacia* species are described. The bark, gum and roots are the main usable parts used. Most of the extracts are used as astringents to treat gastrointestinal disorders. The gum is used in indigenous medicine to stop bleeding (Saleem et al., 1998). It is demulcent and used as an emulsifying agent (Anonymous, 1985b). The nutritional evaluation of rhea (*A. leucophloea*) tree leaves in goats was worked out by Tiwari et al. (1998).

**Phytochemical work:**

The different parts of the plant were chemically examined. The stem bark is reported to contain n-hexacosanol, β-sitosterol, β-amyrin. The highly astringent stem bark of *A. leucophloea* was reported to contain varying amounts of tannins (Trivedi and Mishra, 1984). Isoeckanin, cyanin and leucodelphinincin-3-o-a-L-rhamnopyranoside were isolated from the stem bark of *A. leucophloea* by earlier workers. The isolation and characterization of octacosanol and (+) pinitol from the heart wood of *A. leucophloea* which were reported for the first time in this plant (Srivastava and Agnihotri, 1984). Octacosanol and (+) pinitol were isolated from the heartwood of this plant (Srivastava and Agnihotri, 1984). The identity of this compound was further confirmed by m. p. and Co-TLC with an authentic sample of (+) pinitol. The ash analysis of heartwood was reported in the literature.

Several earlier workers have studied the various phytochemical aspects of the fruits of *A. leucophloea* (Srivastava and Agnihotri, 1984; Perales, 1980). Isolation and characterisation of behenic ester, β-sitosterol, quercetin-3-glucoside and mannitol from the flowers of *A. leucophloea* was described by Khan et al. (1991).

The seed analysis was reported in 1971: moisture - 71%, protein - 27.4%, pentasan in mucilage - 29.0%. The oil composition of the seeds was studied in 1981 and reported the following characteristics of the oil, saponification value - 193.4 - 194.9%, iodine value - 110.3 - 111.2%, oil -
12.61%, acid value - 1.0 - 1.1%, ester value - 193.8 - 194.4%, specific gravity d₄₀ = 1.108, viscosity E at 32°C - 64.5, moisture - 6.04%, ash content - 1.04%, optical activity - no rotation in 2% solution of CHCl₃, soluble in organic solvents and showed charring with conc. sulphuric acid.

Its leaves and pods contain alarming quantities of hydrocyanic acid. From its pods behenic ester has been isolated, having the molecular formula: C₁₉H₃₉COOC₂₈H₅₇, β-sitosterol, luteolin and mannitol were reported by Khan et al. (1990).

In view of the important medicinal properties attributed to this plant in the traditional system of medicine and no much work has been reported on its flowers, therefore, the further studies have been undertaken.

**Calliandra haematocephala** Hassk. *(Mimosaceae)*

**Distribution:**

*Calliandra haematocephala* is a native of Brazil. It is distributed throughout tropical and sub-tropical America, West Africa and India. About 10 species are met within India and cultivated for fuel and for ornament in gardens (Bailey, 1954; Oommachan, 1977; Hooker, 1979; Maheshwari, 1997).

**Botanical description:**

*C. haematocephala* is a bushy shrub, 1.5-4.0 m in height. Branches terete, woody. Leaves bipinnate, petioles very short, eglandular; stipules oblong, about 0.75 cm long. Pinnae 2, rachis ending in a sterile tip. Leaflets 9-12 pairs in each pinna, sessile, extistpellate, oblique, mature ones about 4 cm long, flowers purple or which with long purple stamen. Pods strap-shaped, about 6.25x1.25 cm glabrous, reticulately veined, sutures thick, raised, striated. Flowers occur in
CHAPTER 2

REVIEW OF LITERATURE

January to April and fruits in April - June Bailey, 1954; Oommachan, 1977; Hooker, 1979; Anonymous, 1985a; Maheshwari, 1997).

Medicinal properties and uses:

*C. haematocephala* is a tropical legume. The decoction of the flowers is said to be blood purifier; it is also regarded as tonic. For this purpose the dried flowers are used medicinally (Dastur, 1970; Anonymous, 1985a; Khan and Ahmad, 1993; Oudhia, 2000).

Phytochemical work:

Three new amino-acids were isolated and identified by Marlier (1975) from *C. haematocephala*. A new naturally occurring piperolic acid derivative was isolated by Marlier et al. (1979) from the leaves of the legume *C. haematocephala*. Its structure was shown to be 2S, 4R-carboxy-2-acetylamino-4-piperidine by chemical and spectroscopic methods. The studies on the effect of plant seed extracts on different isolates of *Pseudomonas aeruginosa* were reported by Chatterjee et al. (1980). Powder puff spiroplasma (a new epiphytic mycoplasma) was isolated by McCoy et al. (1982). Six amino acid components of the free amino acid pool of leaves of *Calliandra* species were tested for insecticidal activity against the polyphagous herbivore *Spodoptera frugiperda* (Romeo, 1984).

In view of important medicinal properties attributed to this plant and no much work has been reported on its flowers therefore, the further studies have been undertaken.

**Ehretia aspera** Willd. (Ehretiaceae)

**Distribution:**

*Ehretia aspera* is found in Abyssinia, Mayanmar, Afghanistan, Pakistan (Baluchistan & Sind), in the dry regions of Deccan Peninsula extending northwards to Uttar Pradesh and Punjab. It commonly occurs throughout in Punjab, Uttar Pradesh, Maharashatra, Gujrat and...
Rajasthan. In Delhi it also occurs on the ridge as a short, woody, spreading or diffuse shrub amongst gravel and stones (Hooker, 1885; Bailey, 1954; Cooke, 1958; Shetty and Singh, 1991; Bhandari, 1995; Maheshwari, 1997).

**Botanical description:**

*E. aspera* is a shrub with short, terete, glabrous branches, downy when young. Bark greenish or grey-white. Leaves variable, elliptic, obovate or spatulate, scabrous and shortly hairy above, persistently hairy beneath. Flowers white, in dense, corymbose cymes becoming paniculately lax later. Flowers occur in June-August (Hooker, 1885; Bailey, 1954; Cooke, 1958; Shetty and Singh, 1991; Bhandari, 1995; Maheshwari, 1997).

**Medicinal properties and uses:**

A decoction of the fresh roots is given in venereal diseases (Anonymous, 1989; Kirtikar and Basu, 1994; Chopra et al., 1996). Other uses are more or less similar to those of *Ehretia leavis*, which it closely resembles (Asolkar et al., 1992).

**Phytochemical work:**

Pyrrrolizidine, retronecanol and *p*-methoxybenzoic acid were isolated by Suri et al. (1980) from the leaves of *E. aspera* and structure of ehretinine was also reported by Suri et al. (1980) and Chopra et al. (1996).

In view of an important medicinal properties attributed to this plant in the traditional system of medicine and no much work has been reported on its leaves, therefore, the further studies have been undertaken.
Leucaena leucocephala (Lamk.) Wit.
syn Mimosa leucocephala Lamk.
Leucaena glauca Benth. (Mimosaceae)

Distribution:

Leucaena leucocephala is a native of tropical America and distributed in tropical Asia and Africa. It was naturalized in the Bombay area and more or less throughout India. The plant is common in gardens, where owing to its spreading roots, it is difficult to eradicate. In Delhi state it commonly occurs along the hedges of cultivated fields and near habitations, sometime planted (Hooker, 1979; Bailey, 1954; Cooke, 1958; Shetty and Singh, 1987; Bhandari, 1995; Maheshwari, 1997).

Botanical description:

L. leucocephala is a large erect shrub or small tree up to 1.8-6 m high, young branches densely greyish pubescent. Pinnae 4-8 pairs. Leaflets 10-15 pairs, linear. Flowers whitish, in a dense globular head. Pods 12-16x1-1.5 cm clustered in umbels, linear, flat, minutely pilose, brownish in colour. Seeds 15-25, c. 7.5 x 5.0 mm, ovate-ovobvate, shinning dark brown. Flowers and fruits occur in September-March (Hooker, 1979; Bailey, 1954; Cooke, 1958; Anonymous, 1962; Shetty and Singh, 1987; Kirtikar and Basu, 1993; Bhandari, 1995; Maheshwari, 1997).

Medicinal properties and uses:

Young fruits and seeds of L. leucocephala are edible, and leaves and pods are fed to cattle, sheep and goats. Also grown as shade and cover plants in tea, coffee and rubber plantation (Anonymous, 1962; Kirtikar and Basu, 1993; Singh et al., 1996). Shelton and Brewbaker (1994) have mentioned L. leucocephala the most widely used forage tree legume. The bark of L. leucocephala is eaten for internal pain in Assam (Kirtikar and Basu, 1993; Chopra et al., 1996). The bark of the plant is also used in the Philippines for toughening fishing tackles (Anonymous,
1962). Powdered seeds of *L. leucocephala* syn. *L. glauca* are considered as a manure (Anonymous, 1962). The leaves are a good source of protein and carotene and can be employed as supplement to alfalfa leaf meal in poultry rations (Kirtikar and Basu, 1993; Chopra et al., 1996). When consumed in excessive quantities, all parts of *L. leucocephala* are toxic to monogastric animals, like horses, pigs, rabbits and chicken and cause great loss of hair; regeneration of hair is observed when the animals stop eating the plant *L. leucocephala* is also reported to cause loss of fertility (Anonymous, 1962; Kirtikar and Basu, 1993; Chopra et al., 1996; Singh et al., 1996). The wood of *L. leucocephala* is hard, strong, medium-texture and close-grained. It is burned as fuel or for making charcoal. The wood has been tried as a raw material for paper pulp (Kirtikar and Basu, 1993). Young shoots and immature pods are eaten as vegetable in some countries. The shiny seeds are used in fancy baskets, purses and ornaments (Anonymous, 1962; Kirtikar and Basu, 1993; Chopra et al., 1996; Singh et al., 1996).

**Phytochemical work:**

The leaves of *L. leucocephala* contained (dry basis) N, P_2O_5, K_2O and CaO. Leaves and twigs are rich in nitrogen and potassium salts and can be used after composting. The analysis of green foliage gave the following values - dry matter, protein, fat, N-free extr., fibre, mineral matter, digestible protein and total digestible nutrients (Anonymous, 1962; Kirtikar and Basu, 1993; Chopra et al., 1996).

Mimosine was isolated by Kostermans (1946) from the seeds of *L. leucocephala*. A glucoside was isolated from the leaves of *L. leucocephala* by Tominaga (1949). Five flavonol glycosides were isolated by Naokata et al. (1977) from the leaves of *L. leucocephala*. The fatty acid composition of the fixed oils of the seeds of *L. leucocephala* was studied by Nobuhiro et al (1980) and Shamima et al (1989). The seeds also contained mucilage, composed of mannans, galactans and xylans (Anonymous, 1962).
occurrence of a novel galactopinitol in *L. leucocephala* was reported by Chien et al. (1996).

In view of the important medicinal properties attributed to this plant in the traditional system of medicine and no much work has been reported on the leaves, therefore, the further studies have been undertaken.

**Trianthema portulacastrum** Linn. (Aizoaceae)

**Distribution:**

*Trianthema portulacastrum* is a native of tropical America. It is found mostly in tropical countries of Africa and West Asia. It is also found in Ceylon, Sri Lanka, India and Pakistan. It commonly occurs throughout India. In India it occurs abundantly as a weed in wet, cultivated fields as well as in waste, dry or moist places and road sides where it spreads aggressively and also occurs in Delhi as a herbaceous undergrowth on the ridge and roadsides (Dutheie, 1960; Oommachan, 1977; Hooker, 1979; Naithani, 1985; Shetty and Singh, 1987; Bhandari, 1995; Deshpande et al., 1993; Maheshwari, 1997).

**Botanical description:**

It is a prostrate, glabrous slightly pubescent and somewhat succulent spreading herb, 40-65 cm long. Stem more or less angular, glabrous or pubescent, much branched. Leaves sub-fleshy, obliquely, opposite, unequal, broadly obovate, rounded and often apiculate at the apex, cuneate at the base, glabrous, petiole much dialated and membranous at the base. Flowers pink or white, solitary, sessile, in pouch-like petiolar sheaths. Calyx tube scarious, lobes 5, cuspidate, slightly petaloid. Petals 5 pinkish white, stamens 10-20, anther pink or white. Ovary more or less conical. Style 1, linear, persistent. Capsule breaking transversely into an upper coriaceous and a lower membranous cup. Seeds dull black. Flowers and fruits occur in June - December.
CHAPTER 2

REVIEW OF LITERATURE

(Oommachan, 1977; Hooker, 1979; Anonymous, 1982; Shetty and Singh, 1987; Kirtikar and Basu, 1993; Bhandari, 1995; Maheshwari, 1997).

Medicinal properties and uses:

*T. portulacastrum* is an important medicinal plant which is used in Ayurvedic and Unani systems of medicine. The analysis of the green leaves of *T. portulacastrum* was reported by Theophilus and Arulanntham (1949). The plant is attributed with analgesic, antipyretic, antibacterial, antifungal, anthelmintic, anti-inflammatory, CNS depressant, stomachic, alterative and abortificient properties and is claimed to be of value in asthma, bronchitis, ascites, orchitis, cardiovascular disorders, migraine, jaundice, anemia, chest and stomach pain, liver and spleen swellings, uteralgia and coughs. The plant tissue is lithotriptic for kidney and bladder (Khan, 1917; Wahid and Siddiqui, 1961; Anonymous, 1982; Vohra et al., 1983; Naqvi et al., 1991; Singh and Dixit, 1993; Kirtikar and Basu, 1993; Chopra et al., 1996; and Nadkarni, 1998; Khan et al., 2000). Khan (1917) reported that the leaves of the white variety are diuretic and used in edema, dropsy and ascites due to various causes. The stems and leaves are eaten as a vegetable, but they may produce toxic effects in the form of diarrhoea and paralysis. The leaves are eaten as a famine food in India (Anonymous, 1982). The root is aperient, bitter, has cathartic and irritant action. It is used in asthma, amenorrhoea, hepatitis, beriberi, oedema, suppression of the menses, dropsy, ascites, obstruction of the liver and as an abortifacient (Khan, 1917; Anonymous, 1982; Kirtikar and Basu, 1993). The root applied to the eye cures corneal ulcers, itching, dimness of sight, night blindness in Ayurveda (Kirtikar and Basu, 1993). Ahmad et al. (2000) also gave ethnobotanical data on *T. portulacastrum* for the cure of edema.

Phytochemical work:

Chopra et al. (1940) did comparative study on the chemical examination of *Boerhaavia diffusa* Linn and the white and redflowered
'varieties' of *T. portulacastrum*. Trianthemine was isolated by Basu et al. (1947) from *T. monogyna* Linn. syn. *T. portulacastrum*. Ecdysterone 3-4 dimethoxy cinnamic acid and β-cynin were reported in *T. portulacastrum* by Banerji et al. (1971) and Singh et al. (1982). The analysis of the diseased leaves of *T. portulacastrum* showed that quercetin and ferulic acid newly synthesized in the plant were due to fungal infection (Parikh and Daniel, 1992). Vanillic acid, flavone and phytoecdysones were also isolated by Parikh and Daniel (1992) from *T. portulacastrum*. Mukhopadhyay and Jayaram (1988) studied the mineral composition of important weeds of lateritic belt of West Bengal and reported the mineral ferrous (Fe) from *T. portulacastrum*. Jain (1996) reported the presence of an alkaloid- punarnavine in *T. portulacastrum*.

In view of important medicinal properties attributed to this plant in the traditional system of medicine and no much work has been reported on its aerial parts and roots, therefore, the further studies have been undertaken.

*Mallotus philippensis* Muell. Arg. (Euphorbiaceae)

**Distribution:**

This small evergreen shrub is found throughout the tropical regions of India from an attitude of 1,500 m in the Himalayas southwards upto Kerala. It is commonly found in sal and certain scrub and mixed forests. It is also distributed in Ceylon, the East Indies, Malay Ardipelago as far as Australia (Anonymous, 1962; Oommachan, 1977; Hooker, 1979; Shetty and Singh, 1987; Bhandari, 1995; Chopra et al., 1996 and Maheswari, 1997).

**Botanical description:**

Kamala is a small much-branched, evergreen tree. The bark is thin grey, somewhat rough, young leaves and inflorescence tawny or rusty pubescent, leaves alternate, variable 7.5-15 by 3.2-7.5 cm, ovate or
ovate-lanceolate, acuminate, entire or slightly toothed, glabrous above, pubescent and with numerous orbicular red glands beneath, reticulately veined, base rounded or acute, strongly 3-nerved at the base and with 4-7 pair of nerves above the basal ones; petioles 2.5-5 cm long, cylindric, fulvous pubescent, with 2 small sessile glands one on each side of the summit. Flowers are dioecious, small; the male clustered, sessile or very shortly pedicellate, in erect terminal spikes which are usually several together and often longer than the leaves; the females sessile or nearly so, in short spikes. Male flowers: sepals are 3 mm long, lanceolate, acute. Stamens are numerous. Bracts are 1.5 mm long, broadly ovate, acute. Buds are globally ovoid. Female flowers: calyx is divided nearly to the base, sepal 3 or 4 thicker than in the male, oval-lanceolate. Ovary is with red glands, 3 celled; styles are 3, simple papillose. Capsules are 8-13 mm diameter, 3-lobed, loculicidally 3-valved, covered with a bright red powder consisting of minute stellate hairs and fine grains of a red resinous substance soluble in alcohol and ether. Seeds are 4 mm diameter, sub-globose, black (Anonymous, 1962; Oommachan, 1977; Hooker, 1979; Bhandari, 1995; Kirtikar and Basu, 1996 and Maheswari, 1997).

Medicinal properties and uses:

Kamala, the hairy gland on the fruit, is bitter astringent cathartic and anthelmintic, it is considered specific for tapeworms. An ointment made of kamala with some blend oil is used for ring worm, scabies, herpes, and other parasitic skin diseases and its powder is given internally to relieve leprous eruptions. Kamala powder alone is applied over syphilitic ulcers (Kamala tree has long been valued as the source of a dyeing material known in trade as Kamala ((Anonymous, 1962; Kapoor, 1990; Chopra, 1996; Kirtikar and Basu, 1996 and Nadkarni, 1998). The powder prepared from the fruit is also used as an anthelmintic, vermifuge and purgative medicine. It is also said to possess cathartic properties. Among the Mundas of Chotanagpur, the root, well ground is
rubbed on the painful parts in articular rheumatism. In Katha, Burma, the seeds are ground to a paste and applied to wounds and cuts (Chopra et al., 1996; Kirtikar and Basu, 1994 and Singh et al., 1996).

**Phytochemical work:**

The fruit is reported to contain terpenes and saponins (Bhattacharjee and Das, 1969). Kapoor et al. (1969) reported the absence of saponins and alkaloids in dehisced empty fruit. The presence of flavone and chalcone in the fruit has been reported by Bandopadhyay et al. (1972). *M. philippensis* contains rottlerin and the red compound as the main constituent with small amounts of iso-allorottlerin, the yellow compound and two more compounds, Kamalin I and Kamalin II (Lounasmaa et al., 1975). Alcoholic extract of heart wood, bark and leaves yielded bergenin (Bandopadhyay et al., 1972). The heart wood of tree yielded betul-3-acetate along with lupeol, lepeol acetate, and sitosterol. The stem bark of the plant showed presence of flavonoids and absence of saponins and alkaloids (Gujral et al., 1960; Anonymous, 1962 and Chopra et al., 1996). Plant extract is lethal to trematodes but not nematodes. Alcoholic extract was most effective in vitro and in vivo (Rastogi and Mehrotra 1991).