REVIEW of LITERATURE
3. REVIEW OF LITERATURE

3.1 *Mukia maderspatana* Linn.

**Botanical name**: *Mukia maderspatana* Linn.

**Family**: Cucurbitaceae

**Vernacular Names**:
- **Sanskrit**: Musimusikkayi, Trikosaki
- **Hindi**: Aganaki
- **Telugu**: Noogudosa
- **Tamil**: Musumusukkai
- **Malayalam**: Mandaram

**Distribution**: It is found throughout India up to an altitude of 1,400 m.

**Part used**: Seeds, fruits, leaves, tender shoots and roots.

**Description**

A scabrous scandent or prostrate much branched climbing annual with very hispid angular stem and simple tendrils; leaves simple, alternate ovate or subdeltoid, entire or 3-5 lobed, minutely denticulate, very scabrid above, cordate at the base with a wide sinus; flowers small, yellow, male in small fascicles on very short peduncles, females almost sessile solitary or subfasciculate; fruits globose, brownish yellow, finally turning red, seeds ovoid-oblong, compressed (Singh and Panda, 2005).

**Ethnomedical information**

Leaves are used as an expectorant. The tender shoots and leaves are used as aperients. Root’s decoction is used to control vomiting, flatulence and fever. Roots are chewed to
treat tooth ache. Fruit decoctions are used to treat difficult and painful urination, piles and also used as brain tonic. Powdered root decoction is given to control vomiting. Seed paste is given to treat epilepsy, diarrhea and dysentery. Seed decoction is given along with paste of long pepper to treat abdominal disorders (Singh and Panda, 2005; Raveendra and Martin, 2005; Kirtikar and Basu, 1999; The Wealth of India, 1969).

**Chemical review**

The leaves of *Mukia maderaspatana* contains several phytochemicals, including spinasterol, 22, 23-dihydrospinasterol, β-sitosterol, decosaenoic acid, triterpenes, phenolic compounds and multiple glycosides (22, 23-dihydrospinasterol-3-O-β-d glucoside) (Sinha et al., 1996; Sinha et al., 1997). *Mukia maderaspatana* is reported to contain sugar, amino acids, flavonoids (Retnam and De Britto, 1998) and columbin (Rastogi, 1979). Polyphenol has been characterized as 7-O-β-D-glucopyranosyl-6-C-β-D-glucopyranosylapigenin (saponarin) (Petrus et al., 2011).

An alkaloid, acetamide, 2-cyano-N-(1,1-dimethylethyl), five compounds of terpenoid group, 2-hydroxytetracosanolide (essential oil), nonacosane, didodecyl phthalate, trans-2-Methyl-3-propionyl-cyclopentanone and solanesol (fatty alcohols), a ketone group, Z, Z-6, 28-heptatriactontadien and a phosphine triphenyl has been reported (Mallikadevi et al., 2012).

**Biological review**

The tender shoots and bitter leaves are used as a gentle aperient and prescribed in vertigo and biliousness (The Wealth of India, 1969; Kirthikar and Basu, 1999). The plant has a unique place in the Siddha system of medicine (Kumar and Suresh, 1995). It has been shown to exert hepatoprotective (Thabrew et al., 1988), antioxidant (Jayatilaka et al., 1990), antiinflammatory (Sinha et al., 1997) and antiarthritic (Ramakrishnam et al., 1995) activities. The immunomodulatory activity of the plant has also been established by Thabrew et al., (1991).
Antimicrobial activity of the methanolic and petroleum extract was evaluated by Hemamalini et al., (2007). The ethyl acetate (100, 200, 400 µg/ml), hexane and methanol extracts of the plant have been reported to have antiplatelet activity in in vitro (Iman et al., 2006). The consumption of plant’s leaf tea is reported to decrease the blood pressure and show beneficial effects on lipid profile, fibrinogen, bilirubin and body mass index in human volunteers (Raja et al., 2007). Some tribes of India (Orissa) also use this herb for the treatment of diabetes mellitus (Sinha et al, 1997).

3.2 Raphanus sativus Linn

Botanical name : Raphanus sativus Linn
Family : Brassicaceae
Vernacular Names :

- Sanskrit : Moolaka
- Tamil : Mullangi
- Malayalam : Mullanki
- Telugu : Mullangi
- Gujarati : Mulo

Distribution: It is found throughout India up to an altitude of 3000 m in hilly regions.

Part used: Leaves, seeds and roots.

Description

Annual or biennial plant consists of a rosette of leaves; somewhat later, it bolts and produces flowering stems up to 2½' tall. The basal leaves are up to 7" long and 2½" across; they are oblanceolate, coarsely crenate and pinnately lobed. These lobes may be shallow or deep; the terminal lobe is always the largest. The surface of the basal leaves is usually rough from stiff hairs. The central stem is often reddish at the base, but light green elsewhere; it is either glabrous or covered with scattered stiff hairs. The upper side stems
are very similar, except that there is often a red ring where they branch from the central stem. The central and upper stems terminate in racemes of flowers. Each flower is about 1/3" across, consisting of 4 pink or light purple petals, 4 light green sepals that are linear-oblong, a central pistil and several stamens with yellow anthers. The blooming period occurs during the summer and lasts about 1–1½ months. The seeds are oval-shaped, slightly flattened, and reddish brown. The root system consists of a stout taproot that is somewhat fleshy. It is often reddish, but other color forms occur.

**Ethnomedical information**

The plant is used in the treatment of intestinal parasites. However, the part of the plant used is not specified. The leaves, seeds and old roots are used in the treatment of asthma and other chest complaints. The juice of the fresh leaves is diuretic and laxative. The seed is carminative, diuretic, expectorant, laxative and stomachic. It is taken internally in the treatment of indigestion, abdominal bloating, wind, acid regurgitation, diarrhoea and bronchitis. The root is antiscorbutic, antispasmodic, astringent, cholagogue, digestive and diuretic. It is crushed and used as a poultice for burns, bruises and smelly feet. Radishes are also an excellent food remedy for stone, gravel and scorbatic conditions. The plant contains raphanin, which is antibacterial and antifungal (The Wealth of India, 1969; Nadkarni, 1955).

**Chemical review**

Alkaloid and nitrogen compounds present in the roots are pyrrolidine, phenethylamine, N-methylphenethylamine, 1, 2-pyrrolidin-tion-3-il-3-acid-carboxilic-1, 2, 3, 4-tetrahydro-β-carboline, and sinapine (Marquardt, 1976; Wan, 1984; Weilán et al., 1987). Cytokinin (6-benzylamino-9-glucosylpurine) is a major metabolite of 6-benzylaminopurine (6-BAP) in the root radish. A minor metabolite of 6-BAP from radish has been identified as 6-benzylamino-3-β-D-glucopyranosylpurine (Coeley et al., 1975).
Arabino-3, 6-galactan associated with a hydroxyproline-rich protein portion and carry a unique sugar residue, α-L-fucopyranosyl-(1-2)-α-L-arabinofuranosyl is present (Tsumuraya et al., 1984). Hydroxycoumarins aesculetin and scopoletin have also identified (Stoehr and Herrmann, 1975).

Eleven gibberellins were identified in extracts of mature seed as 13 hydroxy-GAs [GA\textsubscript{1}, 3-epi-GA\textsubscript{1}, GA\textsubscript{8}, GA\textsubscript{17}, GA\textsubscript{19}, GA\textsubscript{20} and a new GA, 12α-hydroxy-GA\textsubscript{20} (GA\textsubscript{77})] and four non-13-hydroxy-GAs [GA\textsubscript{9}, GA\textsubscript{24}, 12β-hydroxy-GA\textsubscript{24}, GA\textsubscript{25}]. The major GAs were GA\textsubscript{8}, GA\textsubscript{20}, and GA\textsubscript{77} (Nakayama et al., 1990).

The indole glucosinolates, 4-methoxy-3-indolymethyl glucosinolate and 1-methoxy-3-indolymethoxy glucosinolate, were absent in seed whereas 4-hydroxy-3-indolymethyl glucosinolate was found in highest concentrations in the seeds. The 3-indolymethyl glucosinolate was found in low levels in seed, but was the dominant indole glucosinolate in the leaf (Sang et al., 1984).

The major anthocyanins of radishes are pelargonidin-3-sophoroside-5-glucoside acetylated with malonic acid and either ferulic or p-coumaric acid. Cinnamic acid acylation site for radish anthocyanins was determined to be at position 6 of glucose-1 of the sophorose substituents by one and two-dimensional \textsuperscript{1}HNMR-\textsuperscript{13}CNMR (Wrolstad et al., 2001). Also 7-glucoside-pelargonidin has been identified in the plant (Harborne, 1963).

Kaempferol-7-O-rhamnoside, isorhamnnetin-7-O-rhamnoside, quercetin-7-O-rhamnoside, kaempferol-3-glucoside-7 rhamnoside, kaempferol-7-glucoside-3 rhamnoside, quercetin-7-O-arabinoside-3-glucoside, and quercetin-7-glucoside-3 rhamnoside have been isolated from \textit{R. raphanistrum} (Kamil and Kalina, 1997). Radishes have a high content of flavonoids as quercetin, kaempferol, myricetin, apigenin and luteolin (Lugasi and Hovar, 2000). Malvidin-3, 5-diglucoside has produced from the callus of radish via tissue cultivation.
The callus contains 16.4% (dry wt) pigments (Genichiro et al., 1991). Rhamnose, glucose, and xylose have also been isolated. Lipopolysaccharides (LPS) have been isolated from radish roots (Kwan et al., 1995).

**Biological review**

The roots stimulate the appetite and digestion, having a tonic and laxative effect upon the intestines and indirectly stimulating the flow of bile. Consuming radish generally results in improved digestion, but some people are sensitive to its acridity and robust action (Chevallier, 1996). The leaves, seeds and old roots are used in the treatment of asthma and other chest complaints (Duke and Ayensu, 1985). The juice of the fresh leaves is diuretic and laxative (Chopra et al., 1986). The seed is carminative, diuretic, expectorant, laxative and stomachic (Yeung, 1985; Duke and Ayensu, 1985; Chopra et al., 1986). It is taken internally in the treatment of indigestion, abdominal bloating, wind, acid regurgitation, diarrhea and bronchitis (Bown, 1995).

The root is antiscorbutic, antispasmodic, astringent, cholagogue, digestive and diuretic. It is crushed and used as a poultice for burns, bruises and smelly feet (Duke and Ayensu, 1985). Radishes are also an excellent food remedy for stone, gravel and scurvy conditions (Grieve, 1984).

The plant contains raphanin, which is antibacterial and antifungal (Duke and Ayensu, 1985; Bown, 1995). It also has been found to be strongly active on Escherichia coli, Pseudomonas pyocyaneus, Salmonella typhi and Bacillus subtilis, etc (Abdou et al., 1972). It inhibits the growth of Staphylococcus aureus, Streptococci, Pneumococci. (Yeung, 1985) It is also active against many food born pathogenic and food spoilage bacteria such as Listeria, Micrococcus, Enterococcus and Lactobacillus. (Yildium and Johnson, 1998). The plant also shows antitumour activity (Duke and Ayensu, 1985).
SELECTED PLANTS

Figure 3.1: *Mukia maderspatana* Linn

Figure 3.2: *Raphanus sativus* Linn