4. Literature review

4.1 *Amaranthus spinosus* Linn.

**Plant Monograph**

**Plant Name** : *Amaranthus spinosus* Linn.

**Family** : Amaranthaceae

**Common names** -

- **English** : Prickly Amaranth
- **Hindi** : Kantabhaji, Kataili-chaulai, Kantanatia
- **Sanskrit** : Alpamarisha, Tandula
- **Bengali** : Kantamaris, Kantanote
- **Gujarati** : Kantalo dhimdo, Kantanu dant, Tandaljo
- **Telegu** : Mullatotakura, Mundla kura, Nalladoggali
- **Tamil** : Mullukeerai, Mud-keerai
- **Uria** : Kantaneutia
- **Malayalam** : Mullan-cheera
Figure 5. Morphology of plant *Amaranthus spinosus*

Whole Plant of *Amaranthus spinosus* Linn.

Leaves of *A. spinosus* showing purple pigmentation
Distribution-
It is an erect spinous annual or perennial herb varying in colour from green to purple, naïve to tropical America. Now widely distributed throughout the tropics and warm temperate regions of Asia from Japan to Indonesia to India, the Pacific islands and Australia as a weed in cultivated as well as fallow lands. 

Description-
The plant is evergreen and drought resistant even under desert conditions. It is an erect, monoecious herb, up to 100–130 cm tall, much branched; stem terete or obtusely angular, glabrous or slightly pubescent, green or variably suffused with purple. The leaves alternate and are simple without stipules; petiole is approximately as long as the leaf blade; The blade shape is ovatelanceolate to rhomboid, 3.5–11 cm × 1–4.5 cm, acute and often slightly decurrent at base, obtuse, rounded or slightly retuse and often short mucronate at apex, entire, glabrous or slightly pubescent on veins when young. The leaves were found to have characteristic odour and bitter in taste. Flowers found throughout the year and fruit is ovoid and contains compressed, shiny, tiny, dark red to black seeds.

Traditional uses-
In Ayurveda, The plant is regarded as emmenagogue and galactogogue. It is used as a refrigerant, diuretic, and purgative, as an enema for stomach troubles, piles, against cholera and also as a sudorific. It prevents vomiting. In Ivory Coast the plant is used for treating leprosy. A decoction of the plant improves digestion, is used in kidney complaints and as a mouth wash for toothache. The decoction with palm nut soap is used to arrest miscarriage. The boiled leaves and roots are given to children as a laxative; they are applied as an emollient poultice to abscesses, boils and burns. The whole plant is used in treatment of snake-bite, but no part of it is an antidote to snake-venom. Root paste in equal proportion with honey is used to control vomiting. The ash of the plant is applied to chancre. (Wealth of India, 2010, Kirtikar & Basu, 2005)
Pharmacological Review

Pundir et al., (1999) reported that purification and properties of a membrane bound oxalate oxidase from A. spinosus Linn. leaves.

Olufemi et al., (2003) studied the effect of Amaranthus spinosus leaf extract on the various haematological parameters like packed cell volume (PCV) red blood cell (RBC), white blood cell (WBC) counts, and haemoglobin (Hb) concentration in growing pigs. Results showed that there were significant reduction in the PCV, RBC and Hb of the pigs administered with ethanol extract of Amaranthus leaf seven days post treatment and their weight gains significantly improved.

Lin et al., (2005) studied that Amaranthus spinosus water extract directly stimulates proliferation of B lymphocytes in vitro. The immuno-stimulating effects of wild Amaranthus spinosus water extract might lead to B lymphocyte activation and subsequent T cell proliferation in vitro.

Hilou et al., (2006) reported that extract obtained from spiny amaranth (Amaranthus spinosus L., Amaranthaceae) showed significant antimalarial activities in the 4-day suppressive antimalarial assay in mice inoculated with red blood cells parasitized with Plasmodium berghei berghei.

Amresh et al., (2008) reported hepatoprotective and antioxidant activity of 50% ethanolic extract of whole plant of Amaranthus spinosus against carbon tetrachloride (CCl₄) induced hepatic damage in rats.

Amresh et al., (2009) reported anti-inflammatory activity of 50% ethanol extract of whole plant of Amaranthus spinosus.

Ashok Kumar et al., (2010a) reported antioxidant activity of Amaranthus spinosus Linn. by Non-Enzymatic haemoglycosylation of different extracts. The degree of haemoglycosylation in the presence of different extracts of Amaranthus spinosus were measured colorimetrically at 520 nm. The preventive effect of haemoglobin glycosylation at the two concentration; 0.5 and 1 mg/mL was estimated as follows: pet. ether; 13.1%, 16.4%, chloroform; 5.7%, 12%, methanol: 36.91%, 56.07% and aqueous: 22.2%, 31.01 %, respectively. The α-tocopheral (Vitamin E) was used as standard.

Ashok Kumar et al., (2010b) studied Antioxidant and antipyretic properties of methanolic extract of Amaranthus spinosus leaves. Antioxidant activity was measured by 1,1-diphenyl-2-picryl-hydrazile (DPPH) free radical scavenging, superoxide anion radical scavenging, hydroxyl
antioxidant activity, free radical scavenging, nitric oxide radical scavenging, ABTS radical scavenging assay and total phenolic content was determined. Antipyretic activity of methanolic extract of A. spinosus was measured by yeast induced pyrexia method at concentration of 200 and 400 mg/kg using paracetamol as standard drug.

**Adewolu et al., (2011)** evaluated the potential of *Amaranthus spinosus* leaf meal as dietary protein source for *Clarias gariepinus* fingerlings and concluded that up to 5% *A. spinosus* leaf meal can be included in the practical diet of *Clarias gariepinus* without affecting growth and feed utilization.

**Chemical Review**

**Azhar-ul-Haq et al., (2004)** isolated Spinoside, new coumaroyl flavone glycoside from the n-butanol fraction of the methanolic extract of the whole plant of *Amaranthus spinosus*.

**Stintzing et al., (2004)** isolated Hydroxycinnamates, Quercetin and Kaempferol glycosides from extract of the stem bark of *Amaranthus spinosus*. 
Chemical Constituents:

- **β-sitosterol**
- **Quercetin**
- **Trigonellin**
- **α-Spinasterol**
- **Amaranthine**
- **β-Carotene**
- **Hentriacontane**
4.2 *Strychnos potatorum* Linn.

**Plant Monograph**

**Plant Name** : *Strychnos potatorum* Linn.

**Family** : Loganiaceae

**Common names** -

- **English**: Clearing-Nut Tree
- **Hindi**: Nirmali, Nelmal, Neimal
- **Sanskrit**: Kataka, Ambuprasadanaphala, Guchhaphala
- **Bengali**: Nirmali
- **Gujarati**: Nirmali
- **Telegu**: Indupachettu, Andugu, Katakamu
- **Tamil**: Akkolam, Tettankottai, Tetta
- **Uria**: Kotaku, Nirmola
- **Malayalam**: Katakam, Tettamparal
Figure 6. Morphology of plant *Strychnos potatorum*

Whole Plant of *Strychnos potatorum* Linn.

Seeds of *Strychnos potatorum*
Distribution-
It is a native of India and plentiful in the deciduous forests of West Bengal, Central and South India up to 1,200 meters. It is also found in south tropical African countries such as Malawi, Zambia, Zimbabwe, Botswana, and Namibia and in Sri Lanka and Myanmar.

Description-
It is a medium sized glabrous deciduous tree having a height of 6-18 meters. Stem grey colored with cracked and scaly bark. Leaves simple, opposite, elliptic, acute and up to 5-12 cm long. Flowers white, fragrant, found as axillary cymes. Fruits ovoid or globose, glabrous berries, it is black when ripe. Seed one or two, circular, yellowish white, about 1 cm in diameter. The seed surface is smooth and even. No specific odour or taste is evident. The seeds are hard and strong, become soft on prolonged boiling. The surface of the dry seed exhibited fine reticulate marking.

Traditional uses-
The seeds resemble those of nux-vomica and, though non-poisonous. The ripe seeds are used for clearing muddy water. The clarification is due to the combined action of colloids and alkaloids in the seeds. The seeds are said to possess tonic, stomachic, demulcent and emetic properties, and are used in acute diarrhea, diabetes, gonorrhea etc. They are of primary importance in the treatment of eye disease particularly conjunctivitis. The seeds are rubbed with honey and a little camphor and the mixture applied to the eyes in lachrymation or copious water. In Madras, the seeds are used in diabetes and gonorrhea. Leaves are used as poultice over maggot infested ulcers. Powdered bark, mixed with lime juice is given in cholera. The seeds have a bitter bad taste, astringent to the bowels, aphrodisiac, tonic, diuretic, good for liver, in kidney complaints, improve the eyesight and a good remedy for snake bite. (Wealth of India, 2009; Kirtikar & Basu, 2005)
Pharmacological Review

Adinolfi et al. (1994) describes the composition of the coagulant polysaccharide fraction from Strychnos potatorum seeds. This fraction comprises a 1:1.7 mixture of a galactomannan and a galactan.

Saha et al. (2001) reported methanol extract of Strychnos potatorum Linn. seeds shows diuretic activity in Wistar albino rats.

Saha et al. (2002) reported the antidiarrhoeal activity of the methanol extract of the dried seeds of Strychnos potatorum has been evaluated out in rats using castor oil induced diarrhea, effects on gastrointestinal motility and on PGE -induced gastric enteropooling models.

Venkataraman et al. (2006) reported the hepatoprotective and antioxidant activities of the seed powder and aqueous extract of Strychnos potatorum seeds against CCl₄ induced acute hepatic injury.

Venkataraman et al. (2007a) reported antiulcerogenic potential of Strychnos potatorum Linn seeds on Aspirin plus pyloric ligation-induced ulcers in experimental rats.

Venkataraman et al. (2007b) reported the anti-inflammatory effect of seed powder and aqueous extract of Strychnos potatorum Linn seed using carrageenin-induced hind paw edema and cotton pellet granuloma models.

Sanmugapriya Ekambaram et al. (2010) reported antiarthritic activity of Strychnos potatorum Linn seeds in Freund’s adjuvant induced arthritic rat model.

Chemical Review

Singh et al. (1978) isolated Isomotiol, a new triterpene from Strychnos potatorum.

Massiot et al. (1992) have been isolated twenty-four compounds and identified in the root bark of Strychnos potatorum. They are: Harmane carboxamide, cantleyine, 18,19-dihydrousambaresine, polyeuridine, norharmane, akuamidine, nor-C-flurocurarine, ochrolifuanine A, bisnordihydrotoxiferine, ochrolifuanine E, normacusine B, normavacurine, henningsamine, 11-methoxyhenningsamine, dihydrolongicaudatine, dihydrolongicaudatine Y, antirhine, (20R)- and (20S)-dihydroantirhine, 11- methoxy-12-hydroxydiaboline, diaboline, 11-methoxydiaboline, desacetylretuline and diaboline N-oxide.
Chemical Constituents-

- β-sitosterol
- Quercetin
- Diaboline
- Linoleic acid
- Compesterol
- Lanost-8-en-3β-ol
Plant Monograph

Plant Name: *Saraca asoca* (Roxb.) De Wilde.

Family: Caesalpiniaceae

Common names:

- **English**: Asoka tree
- **Hindi**: Ashok, Asok
- **Sanskrit**: Anganapriya, Apashoka, Subhaga, Palladru
- **Bengali**: Asok, Asoka
- **Gujarati**: Ashopalava
- **Telegu**: Asokamu, Vanjulamu
- **Tamil**: Asogam, Anagam, Asogu
- **Uria**: Osoko
- **Malayalam**: Hemapushpam, Asoka
Figure 7. Morphology of plant *Saraca asoca*

Whole Plant of *Saraca asoca* (Roxb.) De Wilde

Flowers of *Saraca asoca* (Roxb.) De Wilde
Distribution-
Saraca is a small genus of shrubs or trees distributed in continental South-East Asia from India to South-West China through Malaysia, Sumatra and eastwards to Celebes. It occurs almost throughout India up to an altitude of 750m. in the central and the eastern Himalayas and the Khasi, Garo & Lushai hills. It is also found in the Andaman Islands.

Description-
A tree about 6-9 m. high, branches glabrous. Leaves paripinnate, 15-20 cm long, leaflets 6-12, oblong or oblong lanceolate, corky at the base, petioles very short, stipules intrapetiolar, completely united. Flowers fragrant, orange or orange yellow, eventually turning vermillion, in dense axillary corymbs, pods black, flat, leathery, 10-25 cm x 3.5-5 cm, seeds 4-8, ellipsoid-oblong, 28 cm. compressed.

Traditional uses-
In Ayurveda, The bark is much used in uterine affections and especially in menorrhagia. A decoction of bark in the milk is generally prescribed. The bark is bitter, acrid, anthelmintic, demulcent, emollient, cure dyspepsia, tumors, enlargement of abdomen, useful in fractures of the bones. The seeds are useful in urinary discharges. Leaves possess blood purifying properties and their juice mixed with cumin seeds is used for stomach ache. Flowers pounded in water are used in hemorrhagic dysentery and the dried flowers in diabetes. flowers are considered to be an excellent uterine tonic. they are also considered useful in biliousness and Syphilis. flowers are reported in the preparation of soups. in the Gold Coast, the roots are ground with Mako pepper and boiled in water. The liquor is then drunk with palm wine to cure constipation. Seeds are found efficacious in ringworm. (Wealth of India, 2009; Kirtikar & Basu, 2006)
Pharmacological Review

Varghese et al. (1992) reported that the anticancer principle from Saraca asoca flowers indicated 50 percent cytotoxicity (in vitro) in Dalton’s lymphoma ascites and Sarcoma-180 tumour cells.

Annapurna et al. (1999) reported that anti microbial activity of Saraca asoca leaves.

Seetharam et al. (2003) reported that Bark extracts of Saraca asoca (Roxb.) de Willde were investigated for in vitro antibacterial activity against Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Proteus vulgaris, Bacillus aureus and Klebsiella pneumoniae 4 mg/ml using agar well diffusion method. The ethanol and distilled water extracts showed significant broad spectrum antibacterial activity.

Chhetri et al. (2005) reported by ethnopharmacological survey that infusion of flowers of Saraca asoca used in the treatment of diabetes.

Singh et al. (2009) reported by ethnopharmacological survey that infusion of flowers of Saraca asoca used in the treatment of diabetes.

Singh et al. (2009) reported the molluscicidal activity of bark powder of Saraca asoca, against the snail Lymnaea acuminate. The molluscicidal activity of the plant was found to be both time and concentration dependent.

Pradhan et al. (2010) studied Pharmacognostical feature, including macroscopy, microscopy and analytical profile to investigate the phytochemical and quantitative determination of phyto constituents from the leaves of Saraca asoca.

Maruthappan et al. (2010) reported the effect of aqueous suspension of Saraca indica flower in albino rats to evaluate the antulcer activity by using two models, i.e., pyloric ligation and aspirin induced gastric ulcer. Aqueous suspension decreases the free and total acidity and ulcer index with respect to control in a dose dependent manner.

Chemical Review

Sadhu et al. (2007) isolated five lignan glycosides lyoniside, nudiposide, 5-methoxy-9-b-xylopyranosyl-isolariciresinol, icariside E3, and schizandriside, and three flavonoids epicatechin, epiafzelechin-epicatechin and procyanidin B2, with β-sitosterol glucoside. Their
structures were determined by 1D and 2D nuclear magnetic resonance (NMR) and mass spectroscopic analysis.

**Chemical Constituents**-

- Apigenin
- β-sitosterol
- Catechol
- Gallic Acid
- Haematoxylin
- Ketosterol
- Leucocyanidin
- Quercetin