CHAPTER 2

REVIEW OF LITERATURE

Urtica parviflora Roxb.

2.0 Introduction

Urtica parviflora Roxb. Often called as 'Bichu' in Punjab 'Shishoon' in Kumaon, 'Kaldiya' and 'Kandari' in Garhwal, it is known as 'Shisoona' or 'Shisno' in Nepal to Assam however, the common English names is 'Common Nettle' or 'Stinging Nettle'. *Urtica parviflora* belongs to family URTICACEAE (CHOPRA, 1956).

Fig 2.1 Photograph showing the herb of *Urtica parviflora* Roxb. Obtained from Majhitar, eastern part of Sikkim.

It is a monoecious, perennial herb consisting of long stoloniferous rhizomes found in forests and amongst taller herbaceous vegetation, 1700 - 2800 metres, partly shady, moist places of evergreen forests, along streams, roadsides (1500-2400 m) of Nepal, Bhutan, West China and in North India. In India it is mainly found in the Garhwal Himalayas, Kashmir, Assam and Sikkim (CHOPRA, 1956).

2.1 Morphology

Morphologically it is having slender stems, simple or few branched, 25.50 cm tall stems, petioles and both surfaces of leaf blade sparsely hirtellous and armed with stinging hairs. Stipules greenish, interpetiolar, connate, ovate or oblong-ovate 4.6 mm, membranous, with several ribs, apex shallowly 2-cleft or emarginated, petiole slender 2.5.7 cm, leaf blade broadly ovate or ovate-cordate, 2.5.8.5 × 2.7 cm, often membranous, 5-veined, lateral basal veins arcuate, reaching middle margin, secondary veins 2.4 each side, base rounded or shallowly cordate, margin doubly dentate, teeth increasing in size distally, apex acuminate, cystoliths botuliform or sometimes punctiform. Inflorescences unisexual, male inflorescences in distal axils, spicate, 4.7 cm, female ones in proximal axils, subspicate, slender, with a few short branches, or male flowers in middle axils, female flowers in proximal and distal axils, subequal to or shorter than petioles. Male flowers sessile or short pedicellate, perianth lobes connate 1/2 of length, densely hirtellous, then glabrescent. The female flowers have perianth lobes connate at base, unequal, dorsal and ventral lobes suborbicular, sparsely setulose, lateral lobes broadly obovate. The leaves of the plants have stinging hairs, causing irritation to the skin. Young cooked leaves are very nutritious food, high in vitamins and minerals, especially of α-tocopherol and vitamin C (Fritioff, 2005).

2.2 Phytochemical review and ethno-medicinal uses of nettles

- Methanolic extracts of stinging nettle (*Urtica diocia* L.) roots were investigated for aromatase inhibition. Inhibitory effects on aromatase have been known to date neither for pentacyclic triterpenes nor for secondary fatty alcohols (Dietmar *et al.*, 1995).

- *Urtica diocia* L. is most commonly used for the treatment of Prostatic Hyperplasia (BPH) (Brammer, 2001).

- The presence of histamine, 5-hydroxytryptamine (5-HT), and acetylcholine has been demonstrated in the Indian stinging nettle, *Urtica parviflora* (Roxb). In addition, the presence of a histamine liberating substance is strongly indicated (Saxena, 1965).

- Teng Fie *et al.,* isolated some compounds: beta sitosterol, trans-ferulic acid, dotriacotane, erucic acid, ursolic acid,scopoletin, rutin, quercetin and p-hydroxylbezalcohol. Dotriacotane, erucic acid, scopoletin, rutin and p-hydroxylbezalcohol were obtained from *Urtica* L. for the first time. Their structures were confirmed by modem spectral analysis (Teng Fei, 2007).

- Various types of flavonol glycosides have been isolated from flowers of *Urtica diocia* (Chaurasia *et al.*, 1987).

- Han *et al.* found oxalic acid and tartaric acid in the stinging hairs of *U. thunbergiana* and *U. diocia* (Han *et al., 2006*).

- Mohammed *et al.* found *Urtica diocia* has an antiplatelet action in which flavonoids are mainly implecated. This study supports the traditional use of *Urtica diocia* in the treatment and/or prevention of cardiovascular disease (Mohammed *et al., 2006*).

- *Urtica diocia* extract is an excellent substitute for synthetic COX 2 inhibitors as anti-inflammatory medication, because of its actions against the pathways of inflammatory cytokines (Whyte, 2005).

- From the water extract of the roots of *Urtica diocia* (stinging nettle) a polysaccharides fraction was isolated which revealed activity in the carrageenan rat paw edema model and lymphocyte transformation test (Wagner *et al.*, 1989).

- Isolated nettle polysaccharides promote tumor necrosis factor (TNF) production in-vitro, while whole plant extracts inhibit TNF (Anonymous3, 2007).

- Rhizomes of stinging nettle (*Urtica diocia*) contain a complex mixture of isolectins which exhibit agglutination (Peumans *et al.*, 1986).

- Root extract is used in toothache (Bhattacharjee, 2004).

- Ethnomedicinally it is used infrequently. Decoction of the root is used as febrifuge and as cleansing agent after parturition in females (Srivastava, 1993).

- Fresh root is used for boils in following manner: 500 g of fresh root is washed with water and 100 g wheat flour, 20 g turmeric with 50 g common salt are mixed together. The mixture is fried in mustard oil. Resulting paste is applied in boils for 2 to 3 times for 10 days (Singh, 1995).

2.3 Commercial uses

- Stems yield fibre used for making ropes (Anonymous, 1986).
- The whole plant is used for making nettle beer (Sing, 2005).
- The areal parts are used for making green colored dyes for cloths (Anonymous1, 1985).

Advance research on *Urtica parviflora* Roxb and related species.

Peumans et al., (1984) first isolated a lectin from *U. dioica* rhizomes. It is the first single chain lectin to be found in plants. UDA differs from all other known plant lectins with respect to its molecular structure. It interacts with cells in a specific way & induces γ-interferon production by human lymphocytes.

Shibuya et al., (1986) found UDA has two carbohydrate binding sites per molecule chain. Van Damme *et al* (1988) & Va damme & Peumans (1987) isolated six isororm isolectins from *Urtica* rhizomes. They all induce γ-interferon in fresh human lymphocytes.

Wagner et al., (1987) examined a polysaccharide fraction of the water extract of the roots of *U. dioica* & found anti inflammatory activity in the carrageenan rat paw edema model & lymphocyte transformation test. They also found UDA to stimulate the proliferation of human lymphocytes.

Le Moal et al., (1992) reported that the lectins found in *Urtica* used to stimulate thymocytes and spleen T lymphocytes in mouse.

Obertreis et al., (1996) studied the antiphlogistic effects from the extracts of *Urtica* leaves. They isolated caffeoylmalic acid and and studied its therapeutic effect on rheumatoid arthritis.

Taucher et al., (1996) studied the standardized preparation of *U.diocia* (IDS 23) and found to reduce TNFα, IL-1β after Lipopolyscharides (LPS) stimulation of these cytokines in blood.

Rhiehemann et al., (1999) suggested that ant-inflammatory effect of *Urtica* extracts may be related to inhibitory effect on NF- kappa β activation by IDS 23.

Callicarpa arborea Roxb.

2.4 Introduction

Callicarpa arborea Roxb. often called as 'Bormala', 'Kojo' in Bengali, 'Sunga' in Lepcha and 'Guenlo' in Nepali belongs to family VERBENACEAE.

It is a small, moderate sized tree about 12m in height found in the bamboo and deciduous or mixed evergreen and deciduous forests on mountain slopes(1000-2500) m. of Bangladesh, Bhutan, Cambodia, **India,** Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand and Vietnam. In India it is found in the the upper gangetic plains, lower hills of Kumaon to Sikkim, Assam, Bengal and Khasi hills (300-2000 meters) (Purkayastha *et al.*, 1982, 1985; Pearson *et al.*, 1932).

Fig 2.2 Photograph showing the leaves and inflorescence of *Callicarpa arborea* Roxb. obtained from Majhitar, eastern part of Sikkim.

2.5 Morphology

Morphologically it is having stout trunk with grey short bark with compressed four angled densly tomentose, branchlets, large ovate to ovate-lanceolate or ovate-oblong, acute or sub-acuminate, entire leaves 5.5" by 2.75" to 12" by 5.5", leathery, abaxially densely yellow-brown

stellate tomentose (both sides when young), adaxially dark green and shiny, base cuneate to rounded, marginentire. Cymes 6-11 cm across; peduncle 4-angled, longer than petioles. Calyx cup-shaped, truncate or nearly so, outside densely gray stellate tomentose. Corolla purple, ca. 3 mm. Stamens much longer than corolla. Ovary densely stellate tomentose. Fruit purple-brown, ca. 2 mm in diam. On peduncles 1-2" long which exceed the petioles. Drupe purple, bark-light or sand coloured, blaze soft, white yellowish streaks, hairs present. The bark of the plant is used for medicinal purposes. It mainly consists of aromatic oil containing hydrocyanic acid (Gurung *et al.,* 2002).

2.6 Phytochemical review and ethno-medicinal Uses

- Ethnomedicinally the bark is used as tonic and carminative applied in cutaneous diseases, rheumatism and gonorrhoea (Gurung, 2002)
- Paste of bark and leaf applied on scorpion sting area of skin (Anonymous4, 1976)
- The leaf is used as febrifuge and the bark is used in various skin diseases (Gurung, 2002)

2.7 Commercial uses

- Wood used for making oil, fuel and charcoal (Haines, 1965).

Advance research on *Callicarpa arborea* Roxb.

R. Chenphen et al., (2002) Investigated antimalarial principles from Callicarpa arborea Roxb. and Boesenbergia species.

Gurung 1, (2002) investigated the ethnic use of the plant as the Juice of fruit is used to relief fever.

Blakesley et al., (2002) investigated the ethnomedicinal importance. He examined the the seed germination characteristics of this species.

Morinda citrifolia Linn.

2.8 Introduction

2.8.1 Common Names

Indian Mulberry (India), Noni (Hawaii), Nono (Tahiti and Raratonga), Polynesian Bush Fruit, Painkiller Tree (Caribbean islands), Lada (Guam), Mengkudo (Malaysia (Malaysia), Nhau (South East Asia), Grand Morinda (Vietnam), Cheese fruit (Australia), Kura (Fiji), Bumbo (Africa).

The vernacular names for *Morinda citrifolia* are numerous, almost every island nation of the South Pacific and Caribbean has a term used for this plant (Rita, 1998). *Morinda citrifolia* Linn. often called as Surangi or Bartungi in Hindi, Bengali, Gujurati & Marathi. In Oriya it is called as Achu or Pindra and in Tamil called Nuna, in Nepali it's called as Hardikath, belongs to family RUBIACEAE.

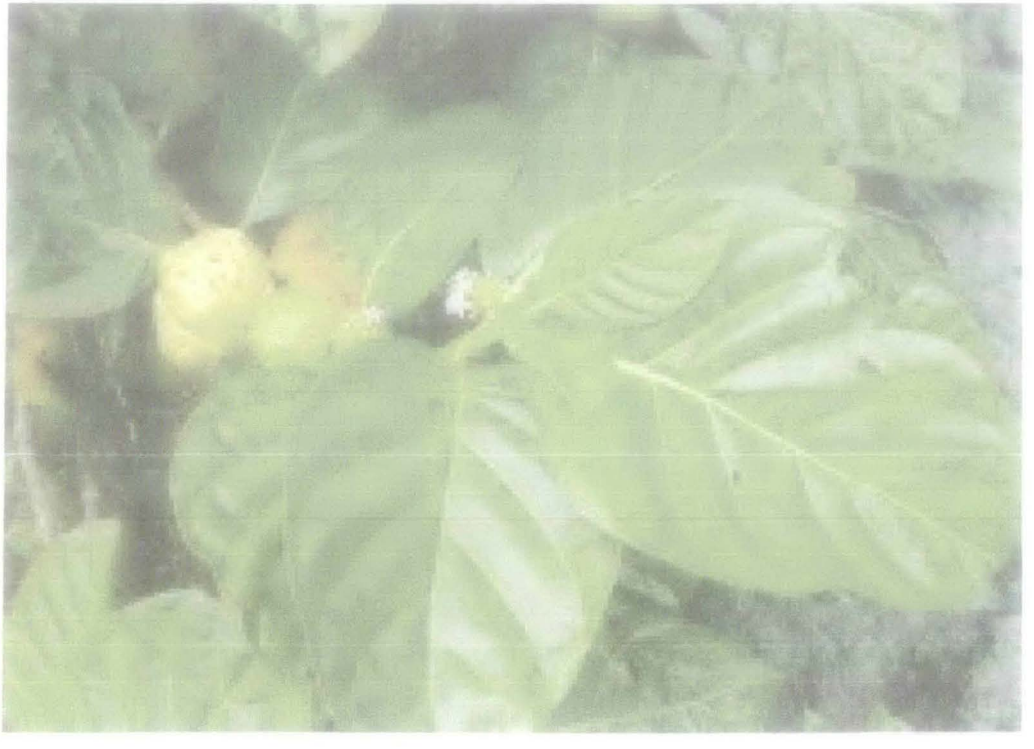

Fig 2.3 Photograph showing the fruit, leaves and inflorescence of *Morinda citrifolia* Linn.

Fig 2.4 Photograph showing the root bark of *Morinda citrifolia* Linn.

2.9 Morphology

A small tree with a straight trunk found throughout the greater part of India including Bengal, Bihar, and Orissa grown as a shade tree and support for pepper vine. Morphologically the plant has broadly elliptic, glabrous, bright green leaves, white flowers, ovoid, glossy white fruits and yellowish brown, fairly hard with close-grained wood. The coloring material resides maximum in root and bark mostly found in young plants. The coloring principle of Morinda root is Morindone (trihydroxymethyl anthraquinone), $C_{15}H_{10}O_5$, m.p= 281-282^{0}c. Morindone present in bark mainly as glucoside morindin ($C_{27}H_{30}O_{14}$). On hydrolysis morindin yields glucose, rhamnose and morindone.

2.10 Phytochemical Review and ethno-medicinal uses

- Noni fruit juice has been reported to have anticancer activity (Cowden, 2005).
- *Morinda citrifolia* found to have insulinotropic activity (Hamid *et al.*, 2008).

- *Morinda citrifolia* has very week esrogenic activity (Chearskul, 2004).
- The root is cathartic. The leaf act as febrifuge and tonic; heals wounds and ulcers. The baked fruit is given in asthma and dysentery. The leaf juice is applied to gout externally (Duduku *et al.,* 2007).
- The fruit is also used for leucorrhoea and sapraemia.
- Traditionally the tender leaves and fruits are used as food.

2.11 Commercial uses

- Commercially the leaves are used to rear silk worm.
- The pulp of the fruit used for cleansing hair.
- The wood is used for turning and for making plates and toys.

2.12 Advance research on *Morinda citrifolia* Linn.

Chafique et al., (1990) worked on the roots of plant for **analgesic** and **behavioral effects** on mice and found non toxic with a dose related effect in 1990. The extract did not exhibit any toxic effects but did show a significant dose related, central analgesic activity in the writhing and hotplate tests; this effect was confirmed by the antagonistic action of naloxone.

Leach et al., (1988) examined the **antibacterial activity** of some medicinal plants of Papua New Guinea. The widespread medicinal use of these plants would suggest they do contain pharmacologically active substances.

Levand et al., (1979) separated several compounds from dried fruit of *Morinda citrifolia* (asperuloside, glucose, caprolic and caprylic acids).

Moorthy et al., (1955) investigate the extract of the roots of this plant for preliminary phytochemical and pharmacological study. This was used as an effective **hypotensive** agent in a majority of patients treated by Dang Van Ho in 1955.

Bushnell et al., (1950) looked into the **antibacterial** properties of this plant found effective against the intestinal pathogens (*P. aeruginosa, M. pyogenes* and *E. coli*). The extract from the ripe fruit was shown to have moderate antibacterial properties against

Salmonella typhosa, *Salmonella Montevideo*, *Salmonella schottmuelleri*, *Shigella paradys*, BH and *Shigella paradys*.

Locher et al., (1995) investigated the **antimicrobial activity** and anticomplement activity of extracts obtained from this plant.

Lung et al., explored the **anticancer activity** of this plant on intraperitoneally implanted Lewis Lung carcinoma in syngeneic mice. The ethanol predipotate (noni-ppt) was not directly toxic to cancer cells. It acts indirectly by enhancing the host immune system involving macrophages or lymphocytes. Noni-ppt had a beneficial effect when combined with suboptimal doses of chemotherapeutic agents. This suggests a possibility of clinical application of noni-ppt in cancer treatment.

Sim et al., (1993) inspect the isolation and characterization of a fluorescent compound from the fruit of *Morinda citifolia* (Noni).

Hiramatsu et al., (1993) were isolated **anthraquinone** from the chloroform extract of the root of this plant and camnacanthal induced normal morphology and cytosketal structure modification in rat- transformed cancer cells.

Kikuzaki et al., were isolated three **new glycosides** from Morinda fruit. They are 6- O-(beta-D-glucopyranosyl)-1-O-octanoyl-beta-D glucopyranose, 6-O- (beta- D-glucopyranosyl)- 1- O-hexanoyl –beta- D glucopyranoseand 3- methylbut- 3-enyl 6-O-beta-D- glucopyranosyl- beta- D- glucopyranoside.

Mieller et al., (200) studied on noni juice for the hidden potential for hyperkalemia. The potassium concentration in noni juice was determined and found to be 56.3m Eq/l, similar to that in orange juice and tomato juice.

Hirazumi et al., (1999) investigated an **immunomodulatory** polysaccharide- rich substance from the fruit substance of *Morinda citifolia* (Noni) with **antitumour activity**. Therapeutic administration of noni-ppr significantly increased survival time of tumor bearing mice. Results also suggested the possibility, that mono-ppt may suppress tumor growth through activation of the host immune system. Noni-ppt was also capable of stimulating the release of several cytokines from immune cells.

Hiwase et al., (1999) inspected that damnacanthal, from *Morinda citrifolia* exhibited apoptosis (cell death) in cancer cells. Damnacanthal treated cancer cells showed more DNA fragmentation from ultraviolet irradiation, than cancer cells treated with ultraviolet radiation alone.

Kikuzaki et al., investigated novel trisaccharide fatty acid ester was 2, 6-di-O- (beta- D-glucopyranosyl) - 1-O-octanoyl-beta- D-glucopyranose identified from the fruits of morinda citrifolia (noni).

Gendong et al., (1998) analyze Jamu Gendong, a kind of traditional medicine in Indonesia for antibacterial and antifungal activities. The results showed the samples were heavily contaminated with bacteria, yeast and moulds.

Hirazumi et al., (1994) investigated antitumor studies of a traditional hawailan medicinal plant. *Morinda citrifolia* (noni-ppt) , in the Lewis Lung peritoneal carcinomatosis model. The pattern of release of these mediators suggested that mono-ppt may promote both a non-specific and th1 cell mediated antitumor response.

Konturek et al., showed that *Morinda citrifolia* (noni) inhibits gastric emptying in male rats via a mechanism involving stimulation of cholecystokinin and its receptor activation. Cholecystokinin is a peptide hormone of the gastrointestinal system responsible for stimulating the digestion of fat and protein. It delays gastric emptying and inhibits gastric acid and plasma gastrin responses

Pu et al., (2004) explored effect of juice from *Morinda citifolia* (Noni) on gastric emptying in male rats. The results suggest that oral noni inhibits gastric emptying in male rats via a mechanism involving stimulation of CCK secretion and CCK1 receptor activation.

Desmond et al., (2004) have been studied two clinical case-study reports on the effects of morinda citrifolia for immune responses pivotal to cancer patient's long term survival. The author concludes that these cases are valuable experiences and hope to stimulate interest in noni research as an important part of adjuvant immunotherapy for cancer.

Wang et al., (2000) were examined of synergistic effects of Tahitian noni juice and methylsulfonymethane on mammary breast cancer prevention at the initiation stage of chemical carcinogenesis induced by DMBA in female Sprague-dawley rats.

Siddiqui et al., (2003) have been isolated and elucidated structural determination of a **benzofuran** and **Bis-Nor- isoprenoid** from Aspergillus niger grown on the water soluble fraction of *Morinda citifolia* Linn. Leaves.

Stalman et al., (2003) were studied on cell cultures of *Morinda citrifolia* L. are capable of accumulating substantial amounts of anthraquinones. All study indicates that the main point of regulation in anthraquinone biosynthesis is located at the entrance of the specific secondary route.

Conrad et al., (2003) inspected the inhibition of angiogenic initiation and disruption of newly established human vascular networks by juice from *Morinda citrifolia* (noni). Noni in concentrations of 5% (V/V) or greater was highly effective in inhibiting the initiation of new vessel sprouts from placental vein explants, compared with initiation in control explants in media supplemented with an equivalent amount of saline.

Wang et al., (1999) reported that noni have antibacterial, antiviral, antitumor, antihelminthic, analgesic, hypotensive, anti-inflammatory, and immune enhancing effects.

Saludes et al., investigated antitubercular constituents from the hexane fraction of *Morinda citrifolia* L. and found the major constituents are E-phytol, cycloartenol, stigmasterool, sitosterol, campesta-5,7,22-trien-3-ol and the ketosteroids stigmasta-4-en-3-one and stigmasta-4-22-dien-3-one.

Xiong et al. studied **antioxidative activity** of extracts from morinda citrifolia L. root, fruit and leaf and found the activity in the roots may be due to both polar and non-polar compounds but, in the leaf and fruit, only to non-polar compounds.

Scott, (2006) evaluated the **antifungal activity** of extracts of *Morinda citrifolia* L. and found it exhibit significant antimicrobial and antifungal activity against various strains of fungi and bacteria A.niger, C.alvicans, E.coli, S.aureus and T. mentagrophytes.

Wang et al., (2002) investigated the protective effects of *Morinda citifolia* on hepatic injury induced by a liver carcinogen and found that as a selective COX-2 inhibitor, it may protect liver by suppressing COX-2 enzymes.

REFERENCES

Abdelkhaleq, L., Abderrahim, Z., Hassane, M., Mohamed, B., Abdelhafid, T., Mohamed, S., Jacqueline, H., Rodolphe, F., Cardiovascular effects of *Urtica diocia* L. in isolated rat heart and aorta. *Phytother Res,* 2002, 9, 16, 6, 503-507.

Anonymous, The Wealth of India, Raw materials, New Delhi: Publication and Information Directorate, CSIR, New Delhi, 1985, 380.

Anonymous1, The Wealth of India, Raw materials, New Delhi: Publication and Information Directorate, CSIR, New Delhi, 1985, 422.

Anonymous2, The Wealth of India, Raw materials, Publication and Information Directorate, CSIR, New Delhi, 1985, 423-425.

Anonymous3, *Urtica diocia*; *Urtica urens* (Nettle)- monograph. *Altern Med Rev*, 2007, 9, 12, 3, 280-284.

Anonymous4, *Bull Bot Surv India*, 1976, 18, 166.

Bhattacharjee, S. K., Hand book of medicinal plants, 4th Ed., pointer publisher, Jaipur, Rajastan, India, 2004, 362-363.

Blakesleya, D., Elliottb, S., Kuarakb, C., Navakitbumrungb, P., Sudarat and Zangkumb. Propagating framework tree species to restore seasonally dry tropical forest: implications of seasonal seed dispersal and dormancy in Forest, Ecology and Management, 2002, 164, 31–38.

Brammer, D. L., Botanical Treatment of Benign, Prostatic Hyperplasia (BPH), *Comple Health Practice Rev*, 2001, 7, 1, 21-24.

Chaurasia, N. and Wichtl, M. Flavonol Glycosides from *Urtica diocia*, *Planta Med,* 1987, 53, 432-434.

Chearskul, S., Kooptiwut, S., Chatchawalvanit, S., Onreabroi, S., Churintrapun, M., Saralamp, P., and Soonthornchareonon, N., *Morinda citrifolia* has very weak estrogenic activity In vivo. *Thai J Physiol Sc*, 2004, 17, 1.

Chenphen, R. Bangkok: Ramkhamhaeng University, 2002, 113, (T E20293).

Chin, W. E., A Guide to Medicinal Plants, Singapore Science Centre, 1992, 106.

Cowden, W. L., Lung cancer: More Hope with Samento and Noni. *Cancer Fix Magazine*, 2005, 2.

Desmond K. W. *Hawaii medical journal*, 2004, 63,182-184.

Dietmar, G. and Gerhard, S. Aromatase Inhibitors from *Urtica diocia* roots, *Planta Med.*, 1995, 4, 61, 2, 138-140.

Ghoraishian S.M., The effect of hazel - leaf decoction on blood glucose reduction in the diabetic rats, *World J Med Sc,* 2006, 1, 2, 144-146.

Gurung 1, B. The medicinal plants of Sikkim Himalaya, Maples, West Sikkim, India, 1st ed., 2002, 266.

Gurung 2, B. The medicinal plants of Sikkim Himalaya, Maples, West Sikkim, India, 1st ed., 2002, 77.

Habib, M. Y., Islam, M. S., Awal, M. A. and. Khan, M. A. Herbal products a novel approach for diabetic patients, 2005, *Pak J Nutr,* 4, 1, 17-21.

Haines, H. H., The botany of Bihar & Orissa, BSI, Calcutta, 1962, 2, 743-744.

Hamid, M., Bohari, S. P. M., Bastami, M. S., Ali A. M., Mustapha, N. M. and Shari K., Evaluaion of the insulinotropic activity of Malayasian traditional plants extract, *J Biol Sc,* 2008, 8, 1, 201-204.

Han, Y. F., Shiang, J. C., Ruei, F. C., Wang, H. D., Ling, L. K. and Rong, N. H. Identification of oxalic acid and Tartaric acid as major president pain inducing toxins in the stinging hairs of the nettle, *Urtica thumbergiana. Annals of Bot,* 2006, 98, 57-65.

Jia, W, Gao, W and Tang, L, Antidiabetic herbal drugs officially approved in China, *Phytother Res* ,2003, 17, 1127–1134.

Mahdi A. A., Chandra A., Singh R. K., Shukla S., Mishra L.C. and Ahmad S., Effect of herbal hypoglycemic agents on oxidative stress and antioxidant status in diabetic rats, *Ind J Clin Biochem,* 2003, 18 , 2, 8-15.

Mc Clatchey, W. From Polynesian Healers to Health Food Stores: Changing perspectives of *Morinda citrifolia* (Rubeaceae), *Integr Cancer Ther,* 2002, 1, 110.

Mohamed, E. H., Mohamed, B., Mourad, B., Mohamed, A., Abdelkhaleq, L., and Hassane M., Inhibition of Rat Platelet Aggregation by *Urtica diocia* leaves extracts, *Phytother Res,* 2006, 4, 18.

Mohamed, B., Fatima, Z. M., Abderrahim, Z., Hassane, M., Mohamed, A. and Abdelkhaleq, L., antihyperglycemic activity of the aqueous extract of *Urtica dioci. Fitoterapia.* 2003, 12, 747-748, 677-681.

Pearson, R. S. and Brown, H. P., Commercial Timbers of India, their distribution, supplies, anatomical structure, physical and mechanical properties and uses. Vol I. Goverment of India, Central Publication Branch, Calcutta, 1932, 548.

Peumans, W. J., Van-damme, E. J. M., Brokaert, W. F. and Willy J., The *Urtica diocia* agglutinin is a complex mixture of isolectins. *Plant physiol,* 1988, 86, 598-601.

Purkayastha S.K. Indian woods, their identification, properties and uses. Volume IV. Myrtaceae to Symplocaceae, Volume V. Oleaceae to Santalaceae. Government of India Press, NASIK 1982, 1985.

Rita, E. M. H., Hawaiian Noni (*Morinda citrifolia*), Woodland Publising, Pleasant Grove, U. T, 1998, 7.

Saxena, P. R., Pant, M.C., Kishor, K. and Bhargava K P, Pharmacologically active constituents of Urtica parviflora (Roxb.), *Can J Physiol Pharmacol,* 1965, 43, 869.

Scot, C. Nelson, Species Profiles for Pacific Island Agroforestry-*Morinda citrifolia* (Noni), 2006,4 ver. 4, www.traditionaltree.org

Sing, M. P., Panda, H., Medicinal herbs with their formulations, Daga Publishing House, Delhi, 2005, 579-580.

Singh, V. Herbal folk remedies of Morne Hills (Haryana), *Fitoterapia*, 1995, 665, 425-430.

Shah, S., Bodhankar, S., Bhonde, R., Mohan, V. Combinative therapeutic approach for better blood sugar level control in alloxan diabetic mice, *Int J Diabet & Metabol*, 2006, 14, 104-105.

Soepadmo, E., The Encyclopedia of Malaysia: Plants, Editions Didier Millet, 1998, 16.

Srivastava, R. C. Medicinal plants of Sikkim Himalayan, *J Res Ind Med*, 1993, 121, 5-14.

Teng-Fei Ji, Cui-Hua Liu, Ai-Guo Wang, Jian-Bo Yang, Ya-Lun Su, Ling Yuan, Xiao-Zhang Feng, Studies on the chemical constituents of *Urtica diocia* L.grown in Tibet Autonomous Region, Zhong Yao Cai. 2007, 1, 30, 6, 662-664.

Wagner, H., Willer, F., Kreher, B., Biologically Active Compounds from the aqueous extact of *Urtica diocia*, *Planta Med*, 1989, 55, 452-454.

Wang, M. Y., Strang international cancer prevention conference, 2000, 10-11.

Wang, M. Y., Brett, J. W., Jensen, C. J., Nowicki, D., Chen, S., Palu, A. K., Anderson, G. *Morinda citrifolia* (Noni): A literature review and recent advances in Noni research, *Acta Pharmacol Sin*, 2002, 23, 12, 1127-1141.

Whyte S., Investigation of the viability of *Urtica dioica* extracts for use in anti-inflammatory rheumatoid arthritis medications, *J Ethnopharmacol*, 2005, 1-44.

Younos, C., Rolland, A., Fleurentin, J., Lanhers, M. C., Misslin, R., Mortier, F. Analgesic and behavioral effects of *Morinda citrifolia*, *Planta Medica*, 1990, 56, 5 430–434.