Chapter VI
Ethnomedicinal, phytochemical, biological and therapeutic activities of the selected species showing similar activities to that of the other species.

Medicinal uses of *I. hirsuta* against **stomach ache** is related with *I. colutea*, *I. arrecta*; **antidiarheal** to that of *I. dalecoides, I. astragalina, I. flavicans I. ennaephylla, I. gerardiana, I. linifolia, I.linnaei, I.lupatana, I.purpurea, I.secundiflora, I.tinctoria, I. truxillensis; skin inflections to that of *Iaspalathoides, I.dendroides, I.ennaephylla, I.heterantha, I.nigritana, I.oblongifolia, I.tinctoria*; **antidote to snake poison** with *I.pulchra, I.purpurea, I. tinctoria, I. zenkeri*; **chest pain** and **cardiovascular diseases**, to that of *I. tinctoria, C. decidua; Immunity enhancement in infants**: to that of *I. flavicans, I.heterantha, I.tinctoria, I.aspalathoides, C. tomentosa, eyeball injury and inflammation of eyelids** to that of *I.aspalathoides, I.oblongifolia, C inermis, urinary problems** to that of *I.oblongifolia*.

*C.zeylanica* showed **antidote to snake poison** to that of *C.inermis, C.napaulensis, I.sicula subsp leucophylla; skin diseases** like *C.aegyptica, I.heteroensis; Inflammations, arthritis and rheumatic pains** to that of *C.aphylla, C.cordifolia, C.decidua, C.erythrocarpos, C.inermis, C.napaulensis, C.orinetalis subsp rupestris, C.ovata, C.sicula subsps leucophylla subsps. mesopotamica, subsps. sicula, subsps. sindiana*, and to that of *C.spinosa. Antitumours* to that of *C.sepiaria, C.tomentosa, C.aphylla, skin diseases** like *C.aegyptia, C.inermis; Hepatoprotective** as *C.sicula subsp sicula, subsp sindiana, C.spinosa. Anthelmintic** as *C.decidua, C.inermis, C.sicula subsp sindiana, C.spinosa. C.sepiaria* also showed equal ethnomedicinal phytochemical and therapeutic activity to that of *C. zeylanica* along with other *Capparis* species especially in healing **skin diseases, inflammation, rheumatic pains, stomachache, antidote to snake bite, reduces sexual weakness** may enhanced **female fertility** to that of *C. zeylanica*.

Pharmacognostic studies of all crude drugs reveals organoleptic macroscopic, microscopic, physicochemical, histochemical, phytochemical and biological activities of the crude drug therapeutic studies, which denotes specific nature of each drug in its characters.
Organoleptic studies of *I.hirsuta*, *C.zeylanica* and *C.sepiaria* powder drugs with fragrant odour, *C.zeylanica* root powder with pungent odour. Secretory trichomes are observed on the *I.hirsuta* fruit, peltate trichomes on the stem of *C. zeylanica*. Highest amounts of total ash, acid soluble ash, water soluble ash and sulphated ash was observed in *I.hirsuta* root powders. Moisture content is more in *I.hirsuta* leaf. Swelling index also in *I.hirsuta* leaf. Extractive values of *I. hirsuta* fruit are highest in alcohol, aqueous and methanol extracts respectively. It is very interesting to found nearly 13-14 secondary metabolites in all parts of all selected species.

Qualitative analysis of Phenolic compounds, flavonoids and anthocyanidins resulted as *I. hirsuta* with highest number of phenolic compounds, followed by *C. zeylanica* and *C. sepiaria*. Where as flavonoids and anthocyanidins are highest in *C.sepiaria* than other species. Quantitative analysis of Phenols, flavonoids, alkaloids and saponins resulted that Phenols as the major constituents of all components, in *I.hirsuta* leaf methanol extracts. Flavonoids in *Capparis* species root bark extracts, Alkaloids in *I. hirsuta* fruit extracts, Saponins are highest in *C. sepiaria* root bark extracts.

Antibacterial and anifungal activity against all selected bacterial and fungal pathogens, *I. hirsuta* leaf and fruit alcohol extracts proved their efficacies with double the zone of inhibition than the control drug. The minimum inhibitory concentrations also proved their efficient lowest minimum inhibitory bacterial concentrations than the control drugs.

Anthemintic activity of *C. zeylanica* root bark methanol and alcohol extracts has been proved very effective in paralyzing and in the death of the worms with in very short period than the present standard drug *Albendazole*.

Presence of high quantities of phenols in all species compared to other respective species, it is observed that LD$_{50}$ values as 33-50% in scavenging free radicals (DPPH) showed as the antioxidant potentials of selected medicinal plants.
CONCLUSIONS

- The selected medicinal *I. hirsuta* leaf juice has been locally used against infant immunity enhancement. It is proved that it may be due to the presence of 14 secondary metabolites in the leaf and in the fruit. And it is also proved due to the presence of the main phytoconstituents nearly 14-16 different phenolic components in each part; flavonoid compounds in leaf 6, root 3, and in fruit 4, the main reason to counteract against the pathogens causing many diseases and immunity development of infants.

- Presence of significant Phenolic acids as p-Hydroxy benzoic acid, Protocatechuic acid, Chlorogenic acid, Coumarin, Coumaric acids, Vanillic acid and Melilotic acids. Protocatechuic acid polymers counter acts against Influenza viruses. And also induce apoptosis against human leukaemia cells, as well as malignant cells of oral cavities. Hence these phenolic compounds may help in the immunity development against Influenza viruses, skin diseases caused by *S. aureus*, Influenza viruses, skin diseases caused by *S. aureus*, and also the lung, kidney and urinary tract infection by *P. aeruginosa*.

- Presence of P-hydroxy benzoic acid acts as major antifungal and antibacterial has been proved its activity against *A. niger* and *C. albicans* may control against kidney, liver damage, haemorrhages of lungs and brain. Also control the fungal infections of mouth, vagina and alimentary tract.

- Presence of Flavonoids like Quercetin, Rutin, Kaempferol, Myricetin prevents from the haemorrhages caused by *C. albicans*. Hence the herbal drug *I. hirsuta* extracts may be recommended to isolate the respective Phenolic compounds to develop infant disease resistant vaccines against various pathogens.

- *C. zeylanica* leaf extracts possessing 22 phenols like Homo-protocatechuic acid (anticancerous antimicrobial, antiviral) Phloretic acid, Ferulic acid (antifungal), Scopoletin (antiviral, antimicrobial) as the significant compounds highest number of 8 flavonoid compounds including Rutin.
(protects capillary fragility, (BP), vasodialatory reduce cholesterol), **Myricetin** (lowers prostrate and colon cancer), **Quercetin** (antihaemorrhagic, anticancerous), **Luteolin** (Diuretic), **Orientin** (anti-inflammatory). Hence may be the combined action of the phenols and flavonoids against the hormonal regulation in enhancing the female fertility as the herbal usage by the local people. Hence it is recommended for the isolation of respective **Phenolic compounds to ameliorate the hormones in developing the fertile egg**.

- *C. sepiaria* possess phenols, flavonoids, as that of *I.hirsuta* and *C.zeylanica* but also possess highest amounts of saponins, and anthocyanindins showed effective antimicrobial activity. Hence it may act as effective drug against **skin diseases** and also against **cardiovascular** and **antitumourous disorders**.

- *C. zeylanica* and *C. sepiaria* methanol extracts has been proved as the best anthelmintics also more effective than the standard drug, Albendazole. This may be due to the presence of **Tannins**. Hence it may be recommended for the isolation of bioactive tannin compound and drug designing against **intestinal pathogenic worms**.

- Antioxidant activity in free radical scavenging of DPPH, with alcohol and methanol extracts of all selected species showed LD<sub>50</sub> values at 80-140 µg/ml with 33 - 55% of inhibition equal to that of control Ascorbic acid may be due to the presence of high quantities of Phenols in all species when compared to the other members of the respective genera. Hence these species are highly recommendable drugs as standard formulations.