REVIEW OF LITERATURE

REVIEW OF LITERATURE

The plant world comprises a rich storehouse of biochemicals that could be tapped for use as pesticides. The toxic constituent present in the plant represent the secondary metabolites and have only an insignificant role in primary physiological processes in plants that synthesize them (Cooper & Johnson, 1984)[7]. Plants are rich source of bioactive organic chemicals. It is estimated that there are about 2,50,000 to 5,00,000 plant species in the world today, Only 10% of these have been examined chemically indicating that there is enormous scope for further work (Benner 1993)[8].The total number of plant chemicals may exceed 4,00,000 of these 10,000 are secondary metabolites whose major role in the plant is reportedly defensive (Swain T.1977)[9].The secondary metabolites produced by

plants are terpenoids, alkoloids, polyacetylenes, flavonoids, unusal amino acids and sugars. The structure of more than 600 alkaliods, 3000 terpenoids several thousands of phenylpropanoids, 1000 flavanoids, 500 quinones, 650 polyacetylenes, and 400 amino acids have already been elucidated (Metcalf & Metcalf,1992)[10]. Many of these protects plants from pests and pathogens.

Basic research for over more than forty years in biology and biochemistry has made it possible to envisage not only how new pesticides may be synthesised but also a completely new approach for the protection of plants using secondary plant products which may be toxic to specific pest yet harmless to man. Some of the secondary metabolites are merely the end product of biosynthetic pathways and other excretory products. Plant synthesize a dazzling array of biologically active products. In case of insects,

various plant products like pyrethrins, nicotine, picrotoxinin affect nerve axons and synapsis, ryanodine affects muscles, rotenone and mammain affects respiration, β-asazone affect reproduction. The pesticidal plant receiving global tention for the last two decades is the wonder tree of Indian origin Neem, *Azadirachta indica*, its seeds are rich storehouse of over 100 tetraterpenoids (Devkumar & Sukhdev 1993)[11]. Neem based products have different mode of action and are medium to broad spectrum insecticides. So many scientist have been worked for the pesticidal properties of different plant species. Dhaliwal & Arora in 1998[2] reviewed the pesticidal properties of some plant species, their literature survey covered 61 plant species. As many as 2121 plant species have been reported to posses pest control properties.

Essential oils derived from medicinal and aromatic plants have been found to exhibit

fungicidal, bactericidal, insecticidal, antifeedant, antigonadal, nematicidal, repellent or attractant activities. These have also proved the usefulness in controlling post harvest fungal diseases, and affect the behaviour response of pests, kill and repel the pest which are harmful to humans, animals and crops. Thus, the essential oil and their constituents have been reported to be a potent source of environmentally safe botanical pesticides that could be explored for commercial application (Gurdip Singh 1999)[12].

The plants *Ichinocarpus frutescens*, *Homononia riparia*, *Laportea interrupta*, *Vernonia anthelmintica* and *Solanum surettense* reported to posses various pharmacological and biological properties.

- *Ichinocarpus frutescens*

Ichinocarpus frutescens is much branched, evergreen climber. The roots of this plant posses various pharmacological properties.

The roots of this plant are sweet, refrigerant, febrifuge, aphrodisiac, alterant, diaphoretic, diuretic, depurative, demulcent and tonic. They are useful in vitiated conditions of pitta, also useful in burning sensation, hyperdipsia, fever, seminal weakness, nephrolithiasis, strangury, skin diseases, leprosy, pruritus, dyspepsia, vomitting, diabetes and also in general weakness.

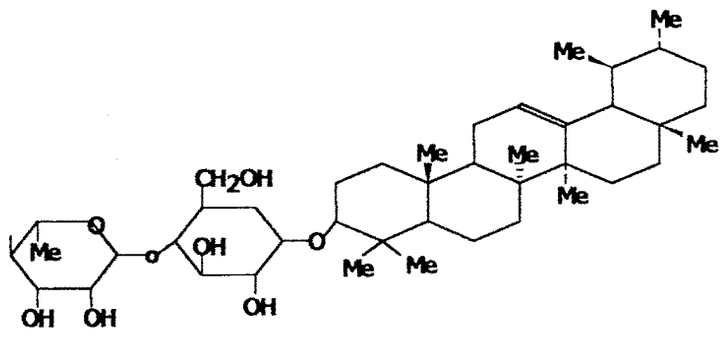
The plant extract of *Ichinocarpus frutescens* posses antifungal, antibacterial, anthelmintic, antiviral, hypoglycaemic and anticancer properties.

Kapoor et.al.in 1969[13] survey roots, leaves, and fruits of *Ichinocarpus frutescens* for

Saponins, alkaloids and flavonoids and reported that roots of this plant contain alkaloids and flavonoids.

Daniel and Subnis, 1978[14] carried out chemotexanomical studies on Apocynaceae and reported distribution of various flavonoids and phenolic acids in the leaves of 22 plants of Apocynaceae family including *Ichinocarpus frutescens.*

Minocha and Tandon, 1980[15] isolated Rhamnopyranosyl glucopyranosylamyrin (I) a new triterpine glycoside from the stems of *Ichinocarpus frutescens* and the structure was determined by chemical and spectral means. And it was characterised as α-L-rhamnopyranosyl (1→4)-β-glucopyranosyl(1→3) , α-amyrin.



Lakshmi et.al in 1985[16],studied triterpenoid constituent of *Ichinocarpus frutescens* and reported that petrolium ether extract of the stems of *Ichinocarpus frutescens* contained α-amyrin and its acetate, lupeol and its acetate, friedelin, epifriedelinol and β-sitosterol.

Jain S.K.[17], 1968 also reported that the unsaponifiable fraction of the fat from the petrolium ether extract of *Ichinocarpus frutescens* roots yielded sitosterol.

K.Yesodharan[18] & Sharma J.K.[19] reported Leaf spot disease of *Ichinocarpus frutescens* during December 1985, which was caused by *Phomopsis ichinocarpi*.

- ***Solanum surettesse*** **Burm f**

Solanum surettense is much branched prickly herb, the whole plant has medicinal properties and used in various pharmacological preparations.

The dried roots of plant constitute a drug. Some antibacterial properties in fruits and shoots have been shown experimentally (Jain S.K., 1968)[17]. The stems and leaves have been tested for antifertility properties.

The plant is bitter, acrid, thermogenic anthelmintic, antiinflammatory anodyne, digestive, carminative, appetiser, stomachic, depurative, sudorific, febrifuge, expectorant, laxative, stimulant, diuretic and rejuvenating. It is useful in viated conditions of vata and kapha, helminthiasis, dentalcaries, inflammation, arthralagia, flatulence, leprosy, skin diseases, hypertension. It is also useful in rheumatoid arthritis, fever, cough, asthma, bronchitis, hicough, cardiac disorders and rhinopathy.

Marumdar in 1984[19], identified solasodine and solasodiene in the tissue of *Solanum surettense* and reported that the ripe fruit of this plant

contain Solasodine 987 mg/100 gm dry wt. and Solasodiene 621 mg/100 gm dry wt.respectively.

Jaiswal et.al in 1984[20] studied free amino acids of some medicinally important plants and reported that seeds of *Solanum surettense* are rich in the essential amino acids. The seeds of the plant contain leucine.

Sharma K.D.1982[21],studied germination of *Solanum surettense* in the presence of 10-50mg of morphactin/lit and observed the stunted radicle and hypocotyl growth and cotyledonary leaf rolling.The effects were partially reserved by 100mg humic acid/lit.

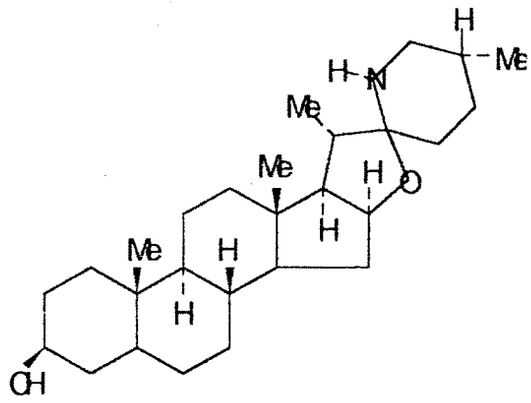
Siddiqui et.al 1983[22] carry out studies in chemical constituents of the fresh berries of *Solanum surettense*. They isolated glyco bases solasonine,solamargins and solasurine as well as apprently partially hydrolysed glyco bases from the fresh, undried, ripe and unripe barries of *Solanum surettense*. The solasodine content is

0.75% and 1.7% (dry wt.basis) in ripe barries. Galactoside, of β-Sitosterol and 2 phenolic substances identified as the Me ester of 3,4-di→hydroxycinnamic acid (Me caffeate) and 3,4-di→hydroxy cinnamic acid (caffeic acid) have also isolated.

Dubey and Gupta, 1978[23], isolated a new flavonol glycoside, Quercetin-3-O-B-D-glucopyranosyl≈O-B-D Mannopyranoside together with apigenins and sistosterol from the flowers of *Solanum surettense* and identified by chemical means.

Ahmad Moghis et.al,1979[24] examined seeds of *Solanum surettense* for crude protein,oil and fatty acids and reported that all seeds are good sources of unsaturated fatty acids which accounted for >50% of the glyceride mixed fatty acids.

Mukherjee et.al 1978[25],isolated solasodine from truits of *Solanum surettense*. They reflux dried powder of berries with EtOH, the combined extracts then evaporated and boiled with HCl to give solasodine-HCl which further treated with NH4OH to give solasodine,the structure was also given.



Subramani et.al 1989[26],reported that *Solanum surettense* produce steroidal alkaloids, solasodine which is a good substitute for diosgenin from *Dioscorea* tubers for the synthesis of corticosteroidal drugs. They also reported

that maximum accumulation of solasodine was occurred in immature barries.

Manjunath et.al 1942[27], isolated glucoalkaloids, solanine-s m-279 from aquious extracts of fruits with molecular formula $C_{44}H_{77}O_{19}N$. They also reported that on hydrolysis it yielded another alkaloid, solanidine-s m-197.5 $(\alpha)^{320}_{D}$, 113.5^0 in CHCl3 with M.F.C26H43O3N. They also identified glucose, rhamnose and galactose in the hydrolysate. They also prepared derivatives of solanine, tribenzoylsolanidine and O-trimethyl-N-methylsolanidine.

Gupta and Dutt in 1938[28],reported that the benzene extract of the seeds of *Solanum surettense* yields, semidrying oil, a lactone $C_{28}H_{47}O_7$,M.P.78^{0}C and a sterol,carpestrol $C_{36}H_{54}O_4$ M.P.216^0 $(\alpha)^{20}_{D}$=-80^0 in $CHCl_3$. In addition to this seeds also gives lactone a glucoalkaloid $C_{44}H_{54}O_2N_2$ M.P.272^0, solanacarpigenin $C_{32}H_{54}O_2N_2$,M.P.96^0

$(\alpha)^{20}D$=+88.7 and glucose, rhamnose and potassium chloride.

Saiyed and Kanga[27] in their previous communication reported isolation of a gluco-alkaloid M.P.245^{0}C from the seeds of the plant by petrolium ether extraction. In addition to this they also extracted two more basic substances melting at 265^0 and 196^0. In latter communication they isolated a glucoalkaloid solanocarpine ($C_{44}H_{43}O_3N$) M.P.288-89^0 in white flat needles and alkaloid called solanocarpidine ($C_{26}H_{43}O_3N$) M.P.197-98^0 in the form of shining plates from the alcoholic extract of the fruits. They have isolated sterol named carpesterol M.P.-248^0 which they have previously reported as a gluco alkaloid and a fixed oil from the petrolium ether extract.

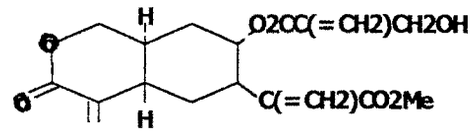
- *Vernonia anthelmintica* Willid

It is generally found in waste lands. Generally fruits of this plant posses various pharmacological properties.

The seeds are used as a remedy for leucoderma and other skin diseases and as anthilmintic.The fruits are bitter, acrid, thermogenic, anthelmintic, astrigent, antiinflammatory, expectorant, depurative, demulcent, purgative, diuretic, stomach febrifuge and tonic.They are useful in inflammations, hicough, cough, asthma, leprosy, prurities, leucoderma, dyspesia, colic, strangury, fever, viated conditions of vata and are very specific for roundworm and threadworm.

Cailas and Mhaskar,1923[30] reported that the seeds contain bitter principle 1%,a fixed oil 18% and a small amount of essential oil.They also reported that the plant posses insecticidal as well as insect repellent properties.

Asaka et.al,1977[31], studied bitter principle from *Vernonia anthilmintica* and reported that repeated chromatography of ether extract of dried seeds on silica gel to give crystalline Vernodadol(I), a new elemanolide lactone with M.F.$C_{20}H_{24}O_8$,M.P.133-4^{0}C $(\alpha)_D$ +36.5^0.



Thanki and Thaker,1978[32],studied amino acid composition of *Vernonia anthelmintica* seeds they determined amino acid composition by chromatography by using different solvents like BuOH:ACOH:water (4:1:5) and phenol:M-Cresol:Buffer (25:25:75) and sprayed with ninhydrine(1%in Me_2CO).

Majumdar D.N.in 1943[33],studied different properties of seeds of *Vernonia anthelmintica*, they carry out alkaloid test of seeds but it give negative test, later they studied different

properties of pet ether,CHCl3,and EtOH extracts of seeds and reported following properties n_{32} 1.4860,α30 9-8^0,d30 0.9050,sapon-value 175.5,acid value 51.3 I value 54.63, unsaponifiable matter 1.68% and AC value 106.72.They also reported that the unsaponifiable fraction contain brassicasterol, stigmasterol and sterol.Other fractions contain steric, palmitic, myristic, oleic, monohydroxy oleic acids and two noncrystalline, bitter principles of resins. They also reported that 60 and 90% of alcoholic extracts of the drug posses good anthelmintic action against threadworms.

Plattner R.D. 1981[34],studied high performance liquid chromatography of triglycerides of seed oil of *Vernonia anthelmintica*. He demonstrated different procedures for application of high performance liquid chromatography of triglycerides in addition to this they also

studied effect of carbon number and double bond number on retention value.

Bhopale et.al,1981[35], studied effect of solvents on reduction of *Vernonia anthilmintica* seed oil with hydrazine hydrate. They use seed oil of this plant (6gm,iodine no.108.0, oxirane-3.461) in 60ml EtOH(64-17-5),1,4-dioxane hydrate (7803-57-8),for iodine no. and specific rotation and observed that epoxy oxygen was reduced at a higher rate in EtOH whereas decrease in unsaturation was greater in benzene.

Fernander et.al,1983[36], reported that polymerisation of Vernonia oil, a natural triglyceride containing many epoxy groups with sabecic acid (111-20-6) give polyester type of soft elastomers with resemble to those formed with castor oil. Styrene and divinylbenzene were copolymerised in presence of vernonia oil to form interpenetrating networks having promising properties with opaque white tough elastomers.

Perez Souto and Nestor in 1984[37] detected sesquiterpene lactones in *Vernonia spp.* using UV spectroscopy and reported prescence of sesquiterpene lactones in *Vernonia spp.*

- ***Homononia riparia***

It is evergreen shrub. Roots, leaves and fruits of this plant posses various pharmacological properties. The roots are lexative, diuretic, refrigerant, depurative and emetic. They are useful in haemorrhoids, vesicalcalculi, strangury, gonorrhea, syphili and odontalgia. The leaves are depurative and antiseptic and useful for ulcers, wounds and skin diseases.

The plant excluding roots shows antibacterial, antifungal, antiprotozoal, antiviral, hypoglycemic and anticancer activity. Its LD50 is 500mg/kg.(Bhakuni et.al,1969)[38].

Chopra et.al,1956[39], reported that milky juice of *Homononia riparia* contains toxalbumin crepetin.

Chemical investigation of this plant yet not been reported.

- ***Laportea interrupta***

These are stinging plants,also known as neetles.The stinging hairs are present on stems and leaves.

The plants are with prickly hairs, on contact with which causes irritation and transitory. It acts as systemic poison as well as it causes sneezing, sleeplessness and fever, so it is also called as fever neetle.

Behl and Captan[40], 1979, reported that prickly hairs of the plant contain formic acid, which cause irritation. They also reported that the protoplasm of hair which encloses an acid

cell sap contains formic acetic, butyric and other volatile fatty acids, and a specific poison in solution of these acids.

The pharmacological properties of this plant are yet not reported.