SECTION - VI

DISCUSSION AND CONCLUSION
Man's curiosity of the study of plants dates back to the earliest days of the human history because plants served his day to day necessities. All over the world man has attempted to utilize the flora of his respective region for the relief of ailments. Plants have been also traditionally used as medicine by oboriginal people. This attempt was introduced by John W. Harshberger in the year 1895 as ethnobotany.

This subject gained importance during the previous few decades under many respective interdisciplines as Ethnomedicine, Ethnoecology, Ethnopharmacology and Ethnogynaecology etc. of which Ethnomedicinal knowledge is very ancient in India. Even recorded Ethnobotany, Ethnomedicine of India is among the earliest in the world. Though all traditional systems of medicine had their root in primitive records. Our ancient literature is full of references of plants, pharmacological uses for the treatment and cure of different diseases. Ayurveda contains detailed account of different plants of Ethnomedicinal importance with their mode of administration and action. Charak and Sushruta mentioned about 700 plants as therapeutic agents, out of which about 500 are mentioned in Indian
flora, though a few of them came from Rigveda (450-1600 BC). Our present day knowledge of Indian material medical accounts for nearly 3500 species under various crude drugs both of indigenous and exotic origin. There has been a rapid and wide-spread interest in recent years in Ethnomedicinal researches, mainly because of the potentially new medicines and their economic viability in increasing Scientific Experimental research of ancient glorious traditional systems of medicine.

Many of our official drugs have come accidentally through the work of Explorers, travellers, missionaries etc. The further evaluation of these drugs are made by botanists, chemists, Ethnobotanists engaged in their own research than by expeditions sent out to find out new drugs. Since new researches specialised in gathering knowledge of plants and consequently formed a bridge between natives and plants.

During the last few decades modern drugs have saved many lives and have prolonged life span of many patients. The major contribution has been through chemotherapeutic agents for control of infection. These synthetic drugs being pure synthetic chemicals, induced cellular changes act as a foreign substance to the body system and produce several side and toxic
effects resulting in allergy, haemorrhage, ulcer and even may cause death. On account of above facts modern medical scientists are giving Emphasis on alternative medicines from traditional and folklore drugs of plant origin. Experimental and clinical pharmacology formed the scientific base for evaluation of such new drugs.

Plants have been a valuable sources for new and better drugs and are now leading for the drug development programme. The role of natural products in the development of drugs is necessity of further research in folklore use of single plant or their formulations in medicine.

After the discovery of the scope and importance involved in the study of the plants of ethnomedical importance, numerous investigations have been carried out by various workers in almost every part of the world. Though M.P. is one of the richest part of India concerning plant wealth, comparatively little work has been done in the area of central India. There are few workers, who emphasized on medicinal plants of Madhya Pradesh. Saxena and shukla (1971) gave the information about the medicinal plants of Patalkot, Chindwara district. Ethnomedical knowledge was gathered by Maheswari et al. (1986-1988) about the plants of ethnomedical importance used by Bhil tribes of
Jhabua district. Oommachan et al. (1986) reported certain plants being used by the tribals of Central India. Bhalla (1992) reported 42 leguminous plants of ethnomedicinal importance from five different forests of Sagar district (M.P.).

On account of their great potential for the production of natural indigenous drugs and lack of any previous work on medicinal plants of Sagar and Surguja district the present attempt was made to study the herbal plants, of Asteraceae family, used by the local inhabitants of these regions for the treatment of common ailments. Many areas of this region are inhabited by rural people and forest dwellers, who oftenly use many local plants for the treatment of their ailments. These communities living in remote areas of this region in deep forest provide good scope for the study of the folk medicine. The present investigation was carried out with a view to collect valuable informations on the medicinal uses of wild herbal Asteraceous plants used by the local inhabitants. Surguja is a remote district of Central India being rich in medicinal plants. This area is inhabited by various tribal people separated from urbanization and the impact of modern technological development, thus provide a good and favourable scope for such studies.
According to Jain (1967) for any ethnomedicinal study it is usually more convenient and useful to delimit the area of study by suitable geographical units. Keeping this view the present ethnomedicinal studies were taken up in the Sagar and Surguja districts. The localities selected for this study are inhabited, by people belonging to tribals and backward classes. The information enumerated in the test is based on the personal interview and field visits to various villages. Villagers of these districts appear to posses a good deal of knowlege about the traditional medicines. Many vaidyas, Karirajas and Herbalists of these areas also provided many valuable informations about the treatment of diseases by herbal medicines.

The ethnomedicinal survey carried out in the area under study during last four years (1991-1994) have revealed valuable informations regarding the use of various herbal wild Asteraceous plants. The present work highlights useful information regarding 42 common wild herbal Asteraceous plants which have got specific medicinal value as a remedy in different ailments. All the collected plants were brought into the lab, identified, preserved and kept in herbarium. During survey it was found that all the forty two studied and collected plants were used against 63 different diseases.
Observation of enumeration clearly reveals that many diseases were found to be cured by using different plants by different or same people, though the diseases may not be of very common occurrence. Six species have been found to be used for the cure of Dysentery and Diarrhoea viz. *Elephantopus scaber*, *Glossogyne pinnatifida*, *Laggera aurita*, *Bidens biternata*, *Spilanthes acmalla* and *Tridex procumbers*. Some diseases are also cured by only one or two plants viz. Asthma, Cholera, Constipation, ear complaints, Eye diseases, Goiter, Hysteria, anti-inflammation, Jaundice, piles, Tetanus and ulcer etc. Malaria is cured with the help of *Echinops echinatus*, *Sphaeranthus indicus* and *Cythocline purpurea*. Maximum plants were found to be used for the treatment of cut, wounds, sore, boils, rheumatism and various skin diseases. They are *Sonchus asper*, *Blumea oxyodonta*, *Bidens bipinnata*, *Adenostemma viocosum*, *Bidens biternata*, *Laggera aurita*, *Blumea mollis*, *Pulicaria angustifolia*, *Sonchus asper*, *Artemisia scoparia*, *Blumea membranaceae*, *launaea nudicaulis*, *Tridax procumbens*, *Acanthospermum hispidium*, *Ageratum conyzoides*, *Blumea eriantha*, *Vernonia divergens*, *Xanthium strumarium*.

Plant extract of *Glossocardia bosvallea* was found to be given during pregnanency to prevent miscarriage.
Root extract of *Bainvillea acmella* and *Glossogyne bidens* were observed to be given in impotency. *Sonchus arvensis* and *Blumea oxyodonta* were found to be used as aphrodisiac agent. *Glossocardia bosvallea*, *Elephantopus scaber*, *Artemisia scoparia* and *Ganaphalium polycaulon* are used in pre and post natal complaints during pregnancy.

Anti-fertility drugs presently used are not sufficient and have severe side effect and people are very doubtful about their uses. Aboriginal people of the surveyed area were found to be using three plants i.e. *Glossocardia bosvallea*, *Eclipta prostrata* and *Tagetes erecta* for this purpose. These plants can be analysed further for their antifertility properties and can be used commercially.

Some common and dangerous diseases like asthma, cholera, Eczema, Elephantiasis, Epilepsy, Goiter, Jaundice, Kidney complaints, leprosy, piles, pyrrhoea, rheumatism, scabies, syphilis, urethritis are not curable by allopathy. A very important information was gathered during the survey is that the people of surveyed area are using plants for the treatment of some such chronic diseases which were found to be incurable or only partially curable in the modern system of medicine.

Further the use of modern drugs has resulted
in a variety of drug induced diseases. The synthetic drugs induced cellular changes and act as a foreign substance to the body system and produce several side or toxic effects resulting in allergies, shock, haemorrhage, ulcer and even death. The occurrence of above tragedies from modern drugs has made the modern scientists to think for better safety and investigate alternative medicines from traditional and folklore drugs of plant origin.

During survey, a large number of herbal wild plants of Asteraceae were found to be used for the treatment of various diseases by local rural inhabitants of these studied area of Sagar and Surguja districts of Madhya Pradesh (Central India). Some of them are not published in medicinal literature therefore, it is necessary to popularise their identity and utility.

The above study of the Ethnomedical system of medicine gives the initial medicinal information of plants. Clinically these therapeutic value of said medicinal properties have to justified by further pharmacological, antimicrobial & phytochemical screening of the plants. These types of researches developed new formulations which are pharmacologically active and free from side effects. Such types of studies and data helps a lot in making our country economically
self supporting in the matter of drugs and also in protecting the Ayurvedic system of medicine.

During investigation it appears to be realized that diseases having microbial origin are major problems of these surveyed sites. But people of these areas were found to be very well informed about the uses of some plants for the cure of such type of diseases. The antimicrobial efficiency of various medicinal plants are opened a new era of antibiotics. The antibiotics obtained from herbal drugs are more systematic, less phytotoxic and harmless are being given more emphases then the synthetic antibiotics. Even then very little knowledge is available about the antimicrobial activity of folklore medicinal plants. Data supporting such claims have been presented by Fransworth et al. (1972), Bhakuni et al. (1988, 1990), Malik et al. (1991), Garg (1992) and Khan et al. (1992).

Seeing the severity and prevalence of disease of fungal origin present study was undertaken to test antifungal activity of 24 plant species (Table-I) which are widely distributed at the study sites. These plants were found to be used by rural and tribal people of these areas against many diseases of fungal origin.
The ethanolic extracts of the above 24 considered plants were tested against 10 fungi, viz. Aspergillus niger strain I, Aspergillus niger strain II, Candida albicans, Helminthosporium sativum, Microspermum gypseum, Penicillium spp., Trichoderma viridae, Trichyspermum ammi, Trichophyton mentagrophytes and Chrysosporium pannicalis of Pathogenic characteristics. All the studies have been conducted on PDA medium out of considered 24 plants only 10 plant viz. Acanthospermum hispidum, Blumea oxyodontia, Bidens biternata, Erigeron bonoriensis, Echinops echinatus, Blumea mollis, Blumea eriantha, Centrantherum anthelminticum, Glossocardia bosvallea and Launaea asplenifolia, were found to be antimicrobially active. The results obtained clearly indicate that there is no clear pattern of inhibiting effect of considered plant species against tested fungi.

Persuasive of the results of antimicrobial activity clearly indicates that extracts of Blumea mollis, Blumea oxyodontia, Bidens biternata, Centrantherum anthelminticum, Echinops echinatus, Erigeron bonoriensis and Glossocardia bosvallea in which 0.4 ml of drug demonstrated their maximum fungitoxic action by inhibiting 35% to 60% fungal growth. Observations of the results in the Table I-X indicate that all 10 plants shows more than 50% inhibition against all tested ten fungi.
The results obtained after antifungal screening showed that these considered plants possess antifungal activity, so they can be used against different microorganisms.

After revealing the ethnomedical information gathered during the surveys it has been concluded that many Asteraceous plants are being used to reduce swellings by the rural people of this area. Turner (1965) defined the inflammation as a defence reaction or response to the tissue to infection, irritation, injury which arises from the resultant damage. Inflammation is triggered by cell damage while it is difficult to give an adequate description of the inflammation, phenomenon in terms of cellular event in the injured tissue, but there are certain features of the process that are generally agreed to be characterized by lupus, arthritis, erythematous pemphigas, rheumatism, fever and some time proved to be total when the response of immune system is too intense. Inflammation is a severe problem faced by the people of remote area of considered sites. Pharmacognosy, on which depends the evolution of novel medicine now-a-days, it is developing crude drugs from the active principles of different important plants. Considerable phytochemical and pharmacological investigations on various plants species in the search of anti-inflammatory agents have been carried out by
various workers. Singh et al. (1985) gave review on medicinal chemistry research in India. They told that due to side effects of old anti-inflammatory drugs, new drugs are being searched in Indian laboratory through crude plants drug. Muthain et al. (1993) was introduced, some anti-inflammatory activity of plants flavone. Chawla et al. (1993) had shown anti-inflammatory action on some plants oriented acids and ester. Some workers tried to used directly whole plants as anti-inflammatory agents. Das (1992) had revealed anti-inflammatory effect of Eclipta alba. Valecha et al. (1994) studied Artemisia joponia, Artemisia martima and Artemisia nilegarica and found antimalarial, anti-inflammatory activities in these Asteraceous plants.

To varify the folk claims about their medicinal value anti-inflammatory studies have been carried out to test the activity of Bidens biternata and Glossocardia bosvallea with the help of Carrageenan Induced Hind Paw Method given by Winter et al. (1962). Results obtained after the anti-inflammatory analysis of these plant species, it has been concluded that maximum inhibition of oedema was shown by Bidens biternata and Glossocardia bosvallea. Both of these plant showed reasonably satisfactory activity in comparison to Ibuprofen which was taken as standard drug. These plants are being widely used by tribal and rural people as
anti-inflammatory agent. There is further need to isolate, purify and identify the chemical components of these active plants which are really responsible for the anti-inflammatory activity.

Though our planet earth as well as India is rich with around 6,00,000 plant species, they are ful with ethnomedicinal importance and high nutritive value. Even that 5% plants have been phytochemically analysed in India and only 150 have been commercially explored. People of the world are diverting their attention towards the plant wealth for various purposes, detail phytochemical analysis of every plant species offers a great research opportunity. Many compounds isolated from plants have been adopted by modern pharmacopoeia after a thorough chemical and therapeutic investigations.

To study the mode of physiological action one must know the exact structure of the compound. Instruments like UV, IR, NMR and Mass spectrometres are available for determination of structure of natural products with advanced techniques. The pharmacologists and chemist are able to prepare an indefinite variety of compounds, delicately balancing their toxic effect against their therapeutic properties. We might well expect more and more useful compounds with nature
providing the standing material for research and ethnomedicinal work providing dues to them.

After the establishment of the ethnomedicinal importance of five considered plant species i.e. *Blumea oxyodonta*, *Erigeron bonoriensis*, *Launaea asplenifolia*, *Glossocardia bosvallea* and *Sonchus arvensis* were subjected to phytochemical analysis. These plants were observed to be used against many chronic diseases by tribal and rural people of studied area. Qualitative analysis was carried out on five species. Plant material of these species were extracted in ethanol (90%) in soxhelet extractor. Then qualitative analysis of these species were carried out.

Carbohydrates, aminoacids and glycosides were found to be present in ethanolic extract of all the considered species. The extract of *Blumea oxyodonta* showed the presence of saponins, Tannis, Flavonoids, alkaloids. Phenols and steroids were not detected in *Blumea oxyodonta*. The ethanolic extract of *Erigeron bonoriensis* showed the presence of phenolic compounds and alkaloids while gave negative test for spaponins, Tannins, Flavonoids and steroids. *Launaea asplenifolia* gave positive results for phenols, steroids, and saponins hence, negative results for Tannins, Flavonoids and Alkaloids. Phenols, Steroids, Saponins, Tannins and
flavonoids showed wide distribution in all the considered species. Alkaloids were not recorded in *Glossocardia bosvallea*. *Sonchus arvensis* showed the presence of steroids, saponins, Tannins and Alkaloids. Phenolic compounds and flavonoids were not detected in *Sonchus arvensis*.

All the considered species were further analysed for aminoacids, carbohydrates, Glycosides, Alkaloids and Phenols with the help of thin layer chromatography. Maximum number of amino acids i.e. Histidine, Isoleucine, Alanine, Phenyl alanine, Methionine, Arginine, Glycine, Hydroxyproline, Tryptophan, Lysine, $\alpha$-Alanine shared common presence in *Blumea oxyodonta* and *Glossocardia bosvallea*. *Erigeron bonoriensis* showed the presence of all common amino acids except serine, Aspartic acid, Hydroxyproline and cystine. *Launaea asplenifolia* and *Sonchus arvensis* shared common presence of Alanine, Serine, Tyrosine, Methionine, Glycine, Valine, Tryptophan and these species showed absent of Histidine, Leucine, Phenylalanine, Threonine, Glutamicacid, Arginine, Aspartic acid, Cystine, $\alpha$-Alanine. Alanine, methionine and Glycine were detected in *Blumea oxyodonta, Launaea asplenifolia, Glossocardia bosvallea* and *Sonchus arvensis*. Other aminoacids were very irregular and varied in their distribution.
Chromatographic studies of carbohydrates shows that glucose and sucrose were found to be present in all species i.e. *Blumea oxyodonta*, *Erigeron bonoriensis*, *Launaea asplenifolia*, *Glossocardia bosvalleae* and *Sonchus arvensis*. Saccharose was found to be present only in *Blumea oxyodonta*. Galactose, Arabinose and Maltose was observed to be present only in *Blumea oxyodonta*, *Erigeron bonoriensis* and *Glossocardia bosvalleae*. Fructose was observed to be present only in *Erigeron bonoriensis*. In comparison to the other considered species *Launaea asplenifolia* shows less carbohydrates, only Ribose, Fructose, Rhamnose and Sarbose were recorded.

Chromatographic studies of Glycosides shows that methyl α-D-Lyxopyranoside and methyl β-D-xylopyranoside were found to be present in *Glossocardia bosvalleae* and *Sonchus arvensis*. *Launaea asplenifolia* and *Erigeron bonoriensis* showed the presence of methyl-L-D glucopyranoside and methyl-L-D-gluconopyranoside. Methyl-L-D-Lyxopyranoside, methyl-α-D-galactofuranoside, methyl-L-D-galactopyranoside and methyl-β-cellobioside were not recorded in *Erigeron bonoriensis* and *Launaea asplenifolia*. Methyl-α-cellobioside was showed its distribution only in *Glossocardia bosvalleae*.

Chromatographic studies of glycosides clearly indicates that minimum number of glycosides were detected in all the considered five species.
Alkaloids were also separated by thin layer chromatography in all the five considered plant species. No alkaloids were detected in Glossocardia bosvallea and Launaea asplenifolia. Maximum number of Alkaloids were recorded in Erigeron bononiensis, showed the presence of Thebain, Strychnin, Aconitine, Tryopine, Novocaine, Procaine, Arecoline, Dionine, Pethidine and Gelseminine. Thebain, Procaine and Arecoline were shared their presence with Blumea oxyodonta. Aconitine, Tryopine, Dionine were shared their common presence in Sonchus arvensis. Blumea oxyodonta showed the presence of six Alkaloids in which Narceine and Strychnine were not common. B-Rucine and Coramine were detected only in Sonchus arvensis. Alkaloids, pharmacologically active components were observed widely distributed in the Blumea oxyodonta, Erigeron bononiensis and Sonchus arvensis.

Phenolic compounds were also separated which help in building up nutritive value and internal resistance of the plant. Phenols were detected only in Erigeron bononiensis, Launaea asplenifolia and Glossocardia bosvallea. No phenol was detected in Blumea oxyodonta and Sonchus arvensis.

Phenols, O-cresol and 2-6 Dimethylphenols were found to be present in Erigeron bononiensis and
Glossocardia bosvallea. 2-3-Dimethylphenol and 2-5 Dimethyl phenol were found to be present in Erigeron bonoriensis, Launaea asplenifolia and Glossocardia bosvallea. M-cresol and 3-4-Dimethyl phenol were shown their wide range of distribution only in Glossocardia bosvallea. 2-4-Dimethyl phenol and 3-5-Dimethyl phenol were found to be present only in Launaea asplenifolia.

Finally on the basis of phytochemical data of the Blumea oxyodonta, Erigeron bonoriensis, Launaea asplenifolia, Glossocardia bosvallea and Sonchus arvensis were proved rich in aminoacids, Carbohydrates, Glycosides, Alkaloids and Phenolic constituents. these considered species have got nutritive as well as medicinal value. But chemical distribution of all components were irregular and varied in all the analysed species. There may be various factors responsible for such variation. So there is need to isolate, purify and identify, these chemical components of the active plants for further research.

The high Ethnomedicinal importance of the Erigeron bonoriensis, Echinops echinatus, Glossocardia bosvallea, Sonchus arvensis and Xanthium strumarium, efforts have been made to know the most favourable condition for their best germination and proper growth performance. Preliminary laboratory trials indicated
very low percentage of germination in freshly collected seeds of these considered species. After testing the viability of these species the experiments were performed to break the dormancy of these seeds by different methods. The increase in the percentage germination by mechanical and chemical scarification confirmed that dormancy of seed was due to hard seeds coat.

Seeds study revealed that no germination was observed from freshly collected seeds upto five months but after a storage period of nine months it reached to their maximum germination. It was proved that mature plants produced better seeds which shown constant germination capacity after nine to twelve months of storage period.

Seeds treated by ultraviolet light observed more or less similar results in the all five considered of species. Physical treatment through rupping with sand paper and crushing in pistle morter of some hard seeds like *Xanthium strumarium* and *Echinops echinatus* were shown similar increased germination percentage.

Seeds sown in blacks soil showed 63% germination in *Sonchus arvensis*. *Echinops echinatus*, *Erigeron bonoriensis* and *Glossocardia bosvallea* were recorded
58%, 53.5% and 49% germination respectively. Red soil performed poor results for all the considered species.

Seeds shown in native soil with natural manure (2:1) evaluated highest germination percentage. *Sonchus arvensis, Echinops echinatus, Erigeron bonoriensis, Glossocardia bosvallea* and *Xanthium strumarium* revealed 69.8%, 61.4%, 63% and 64.5% germination respectively in these soil.

All the species can survive in a wide range of soil types. The studies performed on the plant growth performance suggested that Sajapur forest area is most favourable for the luxuriant growth of *Echiniops echinatus* while *Erigeron bonoriensis* grow luxuriantly at Sagar. The environmental condition and soil, characterized by sandy loam with moderate amount of carbon, nitrogen and 6.0 pH of Patheria forest only was found to be suitable for the growth of *Glossocardia bosvallea*. Seeds of *Sonchus arvensis* and *Xanthium strumarium* showed the best germination performance in Ramna forest soil due to the fact that this soil was more fertile and had a higher percentage of organic matter. Variation in the growth performance of studied plant species suggest that all the study sites vary greatly in environmental, edaphic and biotic conditions.
Finally it is concluded that the present work which includes ethnomedicinal, antimicrobial, phytochemical, pharmacological and seed germination studies will be significant to the local people to get the medicinal information of medicinal plants which are growing around themselves. Antimicrobial and phytochemical works will be the key work for the further studies to isolate, identify and to evaluate the pharmacologically active constituents to the scientists who are working or who wish to work in this field onward. Pharmacological studies give the important information about the anti-inflammatory activities of *Glossocardia bosvallea* and *Bidens bipinnata*. This work will be significant to the local inhabitants to use these medicinal plants as an anti-inflammatory drug. The seed study of medicinal plants give the important information about the nature and its behaviour of germination. These seed germination studies will be very much helpful to cultivate these plants on large scale to establish the Ayurvedic industry. As such on the whole some of the wild herbal Asteraceous plant species appeared to be of great fundamental and applied importance.