Discussion

The present study has revealed that as many as 320 plants under 239 genera belonging to 102 families are variously used by the Kom tribe of Manipur. Of these plants 1 species belong to Algae, 1 species to gymnosperm, 3 species to pteridophyte and 3 species to fungi and rest to angiosperms with 253 dicotyledons, 59 monocotyledons spp (Figs.6). Of the plants utilized for their sustenance, there are 123 herbs, 47 shrubs, 81 trees, 20 climbers, 6 grasses and 8 epiphytes (Figs: 7.)

Among the dicotyledons families, plants belonging to Asteraceae, Fabaceae, Verbenaceae, Euphorbeaceae, Lamaiceae, Rutaceae, Solanaceae, Malvaceae, Rubiaceae and Cucurbitaceae are commonly used, while the predominant monocotyledonous are Zingiberaceae, Liliaceae, Araceae and Poaceae(Figs.8,9). They used different parts of plants like leaves, flower, fruits, stem, seeds, roots etc. details of which are given in Figs.10. On the basis of the available data, it is seen that the plants of herbaceous habit are the commonest to be used among the tribe.

Kom tribe use these plants for different purposes like 8 plant species as fuel (Table 5), 15 plant species as socio-religious purposes (Table 6). The study also recorded 33 species of wild edible fruit plants belonging to 26 families in various ways (Table-7). Kom people supplemented their food with a number of wild edible plants. Overall a total of 98 wild plants belonging to 39 families have been documented (Table 8). They also used as many as 30 plant species belonging to 20 genera and 10 families as a spices (Table 9). Each spice has its own aroma, flavour and medicinal value. A total of 8 species are used for dyeing purposes (Table-10).

For their healthcare needs, these people utilize 272 plants species single or in combination for the treatment of various ailments (Fig.:11). 22 species are used against diarrhoea and dysentery (Table-11), 8 species are used against toothache & toothcare (Table 12), 37 species are used against stomach disorder (Table-13), 23 plant species in diabetes (Table-14), 16 species are used against in constipation (Table 15), 10 species against jaundice(Table 16), 21 species against piles (Table-17), 13 species are used against excessive flow of urine/ problem in urination (Table-18), 5 species were reported in fractured bone (Table-19), 8 species against asthma (Table
20), 8 species are used in indigestion (Table 21), 21 species in urinary and kidney stone (Table 22), cold and cough used only 21 species(Table 23),15 species are used in fever (Table 24), 5 species are used in urinary tract infection (Table 25), 9 species are used in tonsillitis(Table 26), 15 species against hypertension(Table 27), 4 species are used in insect bite(Table 28), 27 species used against gynecological problem (Table- 29), 31 species are used in skin diseases (Table - 30), 13 species in arthritis & muscle pain (Table-31), 9 species are used as an insect repellent (Table- 32), 31 species are used in boil, cuts and wounds (Table- 33), 12 species are used in headache / dizziness (Table-34), 6 species are used as blood purifier (Table-35), 5 species are used in paralysis (Table-36), 4 species are used in removing warts (Table-37) and 4 species are used respectively against earache and sinusitis/ nose bleeding (Table:38 - 39).

As regard traditional veterinary herbal remedies, the present study records the uses of 28 plant species in ethnoveterinary medicines(Table 40). A total of 8 species are used for fish poisoning(Table 41) whereas only 3 species are used in the treatment of epilepsy. On the other hand, 21 species are used as hair lotion. Various plant parts such as leaves (158), fruits (64), whole plant (38), stem (13), seeds (13), underground part (37), bark (16), latex (4), flower (14) and Pseudobulb (3) are used for the treatment of the above ailments generally through oral administration.

The Kom tribe use as many as 16 species for tonic effect e.g. *Solanum nigrum, Alangium chinensis, Cinnamomum verum, Tectona grandis, Smilax perfoliata, Citrus medica, Curcuma angustifolia, Curcuma caesia, Dioscora bulbifera, Oroxyllum indicum, Oxalis corniculata, Mucuna bracteata,* etc. For a desired effect, these are mostly given to the patient for period ranging from several days to months.
PHYTOCHEMICAL SCREENING

Introduction

Since time immemorial plant has been used as medicine. It has been estimated that only 10-15 percent of the 7,50,000 existing species of higher plants have been surveyed for biologically actives compound. Approximately one-third of the top selling drugs in the world are natural products or their derivatives often with ethno pharmacological background. Important plant secondary metabolites such as glycosides, flavonoids, lignin, terpenoids and alkaloid have been isolated from plants. Since the use of botanical and herbal remedies has increased dramatically in the last several years, the number of researchers on the isolation and identification of compound from plants have also been increase.

Cotton (1996) and Cox (1994) has suggested that the ethno directed sampling is most likely to succeed in identifying drugs used in the treatment of gastrointestinal, inflammatory and dermatological complaints. New medicines have been discovered with traditional empirical and molecular approaches (Harvey,1999). Traditional approach to make use of materials that has been found by trial and error over many years in different culture and system of medicines (Cotton, 1996).

It is not possible to mention all ethno-phypochemical researches being carried out in India. Chemical constituents present in different plant species were carried out initially by Kapoor et al., (1969, 1971, 1972 and1975); Martin (1995); Suresh et al.,(1995), Singh and Sharma(1997), Zhang et al.,(2004), Maridass et al., (2008). Reddy (1996) studied on Achyranthes aspera L. which is used by Bengali, Manipuris to treat different diseases the plants is believed to be having medicinal properties as well as taken as vegetable in their day today life and they are easily found in their surroundings.

Biochemical studies of different plants parts yielded 11 different bioactive compounds like flavonoids, coumarins, derivatives, carotinoids, anthocyanins, triperternoids, saponins etc. (Reddy, 1996). In North eastern state of the country, the
screening of biochemical substances has been left out in this regard except some minute work from Manipur state and Assam (Singh et al., 1991). Qualitative phytochemical screening of some medicinal plants of Cachar district was carried out in Southern Assam (Das, 2006). Biochemical aspects of some plant species of Lamiaceae was carried in Manipur (Sandhyarani, 2010).

In the present study, phytochemical analysis of a few selected plants have been attempted which are believed to be having medicinal properties as well as taken as vegetable since they are found easily in the surroundings of the Kom tribe.

**Material and methods**

The phytochemical analysis was carried out following the method given by Kapoor *et al.*, (1969). A total of eight (8) plant species were selected and collected from different places inhabited by the Kom Kuki tribe of Manipur. Plant materials were collected in flowering and fruiting stages. Collected plant materials were washed properly and air dried in appropriate place. After drying, the plant materials were grined and sieved. The powdered materials were used for phyto-chemical analysis.

Name of the plants along with families, localities, conditions, part used for investigation are given in the tabular form as follows:

<table>
<thead>
<tr>
<th>Name of the plants</th>
<th>Family</th>
<th>Locality</th>
<th>Condition of the plant materials</th>
<th>Parts used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eryngium foetidum L.</td>
<td>Apiaceae</td>
<td>Sagang</td>
<td>Air dried</td>
<td>Whole plant</td>
</tr>
<tr>
<td>Pimpinella hastata C.B. Clarke</td>
<td>Apiaceae</td>
<td>Thayong</td>
<td>Air dried</td>
<td>Whole plant</td>
</tr>
<tr>
<td>Zanthoxylum acanthopodium DC.</td>
<td>Rutaceae</td>
<td>K.R.lane</td>
<td>Air dried</td>
<td>Leaves</td>
</tr>
</tbody>
</table>
**Extraction of plant samples**

Air dried powdered plant samples were used for phytochemical analysis. An amount of 400 g plant samples were placed in 3 litre conical flask separately and 1000 ml of 95% ethyl alcohol was added in each conical flask containing plant samples. The plant materials and alcohols were mixed well and left overnight at room temperature. In the following day samples were filtered and collected. The extracted samples were evaporated under reduced pressure in a Rotary Evaporator till the crude extracts were 5 g. These crude extracts were used to test for different bioactive compounds like alkaloids, saponins, tannins and flavonoids by using different reagents.

**Preparation of different testing reagents**

The preparation of the reagents was done by the methods given by Kapoor *et al.* (1969). Preparation of the reagents is given below:

**Mayer’s reagent**

It was prepared following the methods of Kapoor *et al.*, (1969). Potassium iodide (5.0 g) was dissolved in 10 ml of distilled water (Soln. A) and 1.358 gm of mercuric chloride was dissolved in 60 ml of water (Soln. B). Soln. A and Soln. B were mixed thoroughly in a graduated beaker and the mixture was made to a volume of 100 ml with distilled water.

**Dragenoff reagent**

It is prepared as 80g Bismuth subnitrite \( \text{Bi(MO}_3\text{)}_5\text{H}_2\text{O} \) was dissolved in 20 ml of concentrated nitric acid \( \text{HNO}_3 \) (Soln. A) and 27.2 of potassium iodide was...
dissolved in 50 ml of distilled water (Soln. B). These two solutions A and B were mixed in a beaker which formed a precipitation. The beaker is allowed to stand till the precipitate of potassium nitrate (KNO₃) was settled down. The supernatant of the solution was discarded and then the remaining precipitate was made up to 100 ml with distilled water.

**Dragendorffs reagent**

A small amount of (8.0 g) bismuth subnitrite was dissolved in 20 ml of conc. HNO₃ (Soln. A) and 27.2 g of potassium iodide was also dissolved in 50 ml of distilled water (Soln. B). These two solutions i.e., solution-A and solution-B were mixed in a beaker. The contents in the beaker formed precipitate and it was allowed to settle down. The supernatant was discarded and then the precipitate was made up to 100 ml with distilled water. Then it was used as testing reagent.

**Gilatin Salt reagent**

Gelatin solution was prepared by mixing the two solutions thoroughly in equal volumes. One solution was 1 % of gelatin solution and another one was 10 % of Sodium chloride.

**Testing of extracts**

Testing of extracts was done following the methods adopted by Farnsworth (1994).

**Testing of Alkaloids**

A little amount of extracted sample was dissolved in 5 ml of 1% hydrochloric acid in test tube and filtered. The solvent was divided in equal volumes in test tubes. Half of the test tube was added with little amount of Mayer’s reagent and the other half of the test tube was tested with a little amount of Dragendorff’s reagent. Formation of precipitate or turbidity shows the presence of alkaloids. If the test indicates the positive response, the confirmation test was also done. It was performed following the method given by Farnsworth (1994). A small amount of extracted sample was dissolved in 5 ml of 1% hydrochloric acid and filtered. The solvent was made distinctly alkaline with 28% of ammonium hydroxide solution and extracted with; the same volume of chloroform. The chloroform solution was extracted with equal volume of 1% hydrochloric acid and a little amount of Dragendorff’s reagent.
was added to it. If any kind of precipitate or turbidity is shown, it confirmed the presence of alkaloids.

**Testing of Tannins**

An amount of extracted sample was dissolved in distilled water and some drops of 1% gelatin salt reagent are added to the test tube. Formation of precipitate in the test tube shows the presence of tannins.

**Testing of Saponins**

A little amount of extracted sample is taken in a test tube. It is shaken vigorously after dissolving in tap water. Development of honey comb froth persisting for 15 minutes indicates presence of saponins.

**Testing of Flavonoids**

About 1 ml of the extracted sample was taken in a test tube. In the test tube, small amount of concentrated hydrochloric acid and a small amount of magnesium turning were added, turning of pinkish red colour of the contents in the test tubes indicate the presence of flavonoids.

**Results and Discussion**

From the qualitative analysis of the present investigation the presence or absence of alkaloids, flavonoids, tannins and saponins are confirmed. The absence of the elements are indicated by ‘-’, presence of trace amount of the elements are represented by ‘+’, presence of medium quantity is substituted by ‘++’ and larger quantity is shown by ‘+++’:

Table 43: **Phyto-chemical screening of Alkaloids, Flavonoids, Saponins and Tannins present in the test samples.**

<table>
<thead>
<tr>
<th>Name of plants</th>
<th>Parts used</th>
<th>Alkaloids</th>
<th>Flavonoids</th>
<th>Saponins</th>
<th>Tannins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erynguim foetidum L.</td>
<td>Whole plant</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Pimpinella hastata C.B. Clarke</td>
<td>Whole plant</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Zanthoxylum acanthopodium DC.</td>
<td>Leaves</td>
<td>+</td>
<td>++</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>
The results of phytochemical screening of some selected medicinal plants shows that alkaloid was found in trace amount in *Eryngium foetidum* L., *Curcuma montana* Rosc., *Curcuma leucorrhiza* Roxb., *Pimpinella hastata* C.B. Clarke, *Plantago erosa* Wall., and *Zanthoxylum acanthopodium* DC. whereas alkaloid was found totally absent in *Houttuynia cordata* Thunb. and *Alpinia officinarum* Hance. Medium quantity of Saponin was found in *Eryngium foetidum* L. and *Curcuma montana* Rosc.. While trace amount of Saponin was found in *Alpinia officinarum* Hance, *Curcuma leucorrhiza* Roxb., *Houttuynia cordata* Thunb., *Plantago erosa* Wall. and *Pimpinella hastata* C.B.Clarke. Saponin was found to be absent in *Zanthoxylum acanthopodium* DC. Tannin was found to be present in all the seven plants species out of the eight selected plants except in *Curcuma leucorrhiza* Roxb.. Trace amount of flavonoid was found in *Alpinia officinarum* Hance, *Plantago erosa* Wall., and *Curcuma leucorrhiza* Roxb. followed by moderate quantity in *Eryngium foetidum* L., *Houttuynia cordata* Thunb., *Curcuma montana* Rosc., *Pimpinella hastata* C.B.Clarke and *Zanthoxylum acanthopodium* DC.

Flavonoids are important constituent in regulating control of growth in some plants and it also adversely affects on insect feeding. Several studies confirmed the presence of these phytochemicals contributing to the medicinal as well as physiological properties of the plants. They have been studied in the treatment of different ailments. Therefore, extracts from some plant could be seen as a good source
for useful drugs. The traditional practitioners recommended for these plants strongly as well as it is suggested that further work should be carried out to isolate, purify and characterize the active constituents responsible for the activity of these plants. Also additional work is encouraged to elucidate the possible mechanism of action of these plant extracts (Nagaranjan, 2013).

The potential of flavonoids is due to their ability to form complex with the extracellular and soluble proteins and to form complex with bacterial cell wall (Marjorie, 1996). They are also known to be effective antioxidant which shows strong anticancer properties (Salah, 1995). The extracts of some plants are found to contain saponins which are known to produce inhibitory effect on inflammation (Just et al., 1998). Saponins have the property of precipitating and coagulating red blood cells. Some of the characteristics of saponins include formation of foams in aqueous solutions, hemolytic activity, cholesterol binding properties and bitterness (Sodipo, 2000). Alkaloids have been associated with the medicinal uses for centuries and one of their common biological properties is their cytotoxicity. Several workers have reported the analgesic, antispasmodic and antibacterial properties of alkaloids. The results obtained in the present study suggests the identification of phytochemical compounds, which have bioactive constituents and these plants are proving to be an increasingly valuable reservoir of bioactive constituents that are medicinally important. Several studies confirmed the presence of these phytochemicals contributing to medicinal as well as physiological properties. The plants studied in the present work have been reported to be used in the treatment of different ailments. Therefore, extracts from these plants could be seen as a good source for useful drugs. Also further work is encouraged to elucidate the possible mechanism of action of these plant extracts.
ANTIMICROBIAL STUDY

Introduction

Traditional use of medicinal plants refers to the long historical use of them. In Ayurveda about 2,000 plant species are considered to have medicinal value for positive health and cure of human ailments (Purohit et al., 2003). The most ancient book ‘Charak Samhita’ contains several therapeutic or internal medicines, about 600 plants used in the formulation of drugs are described in it. Natural products are being used by about 80% of the world population primarily in the developing countries for primarily health care. The chemical compounds present in herbal products are a part of the physiological functions of living organisms and hence they are believed to have better compatibility with the human body (Khanna et al., 1986). Tribal communities use herbal medicines in their own traditional way. As time went on, each tribe added the medicinal power of herbs and their areas to its knowledge base. Many plant species are eaten for their rich phytochemical constituents, are known to possess antibacterial properties against human pathogens. Any investigation on folklore medicine leading to the discovery of new drug remain incomplete if the medicinal important plant are not processed in laboratory clinically. Screening of traditional knowledge about antimicrobial activity of plants followed by chemical analysis may lead to isolation of bioactive molecules of commercial value. Scientist has great interest in the field of research of biologically active natural compound for new sources for medicine. The antimicrobial activity of the plant is due to the presence of secondary metabolites of medicinal importance viz., alkaloids, flavonoids, glycosides, saponins etc. (Sathish kumar et al., 2009). A vast knowledge of how to use the plants against different illness maybe expected to have accumulated in areas where the use of plants is still of great importance (Diallo et al., 1999). Li et al.,(2009) has reviewed the importance of natural product in medicine, Das et al.,(2010) has reviewed the technique/evaluation of medicinal plant products as antimicrobial agent. Rao et al., (2010) has worked on antibacterial activity of Alpinia galanga (L.) Willd. crude extract.
Many researchers have studied the antibacterial activities of different folklore medicinal plants against pathogens of various diseases of human being and plants. Some of them are Madsen & Plate (1952); Ahmed et al., (1999); Das (2006); Kerming et al., (2004); Kowti et al., (2010); Kumar et al., (2011) etc. Keeping the above in view the present investigation was undertaken for screening of some traditional medicinal plants collected from different localities of Kom inhabited areas of 4 districts for their antimicrobial activities against 2 human pathogenic bacterial strains.

Materials and methods:

Selected plant material from different study sites were washed well and air dried in shade. Dried material were grinned to make fine powder and in an air tight bottle for extraction. The name of the selected plants, part used, name of the place of the collection and data are given in the table given below (Table 45).

Table 44: Medicinal plants species used for antibacterial activities:

<table>
<thead>
<tr>
<th>ID No.</th>
<th>Name of the plant species</th>
<th>Place/date of collection</th>
<th>Parts used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hoyttuynia cordata Thunb.</td>
<td>K.R lane. 5.3.2010</td>
<td>Whole plant</td>
</tr>
<tr>
<td>2</td>
<td>Zanthoxyllum acanthopodium DC.</td>
<td>Sinam Kom. 30.11.2010</td>
<td>Leaves</td>
</tr>
<tr>
<td>3</td>
<td>Pimpinella hastata C.B. Clarke</td>
<td>Langsei tampak. 12.7.2010</td>
<td>Above ground part</td>
</tr>
<tr>
<td>4</td>
<td>Eryngium foetidum L.</td>
<td>K.R lane. 5.4.2010</td>
<td>Leaves</td>
</tr>
</tbody>
</table>

Preparation of the extracts

The plants extracts were prepared using the solvents water, methanol and chloroform. 10g of the samples were taken and homogenized with 100ml of the respective solvent. The crude preparation was left overnight in the shaker at the room temperature and then centrifuged at 4000rpm for 20 mins. The supernatant containing the plant extract was then transferred to a preweighed beaker and the extract was concentrated by evaporating the solvent at 60°C. The crude extracts were weighed and
dissolved in a known volume of Hexane to obtain a final concentration of 100mg/ml. The bacteria used were *Bacillus cereus* and *Shigella sonnie*.

**Preparation of media**

Media was prepared using 15g of nutrient agar. It was dissolved in 1000ml of distilled water in a conical flask. The conical flask was plugged with cotton and sterilized by autoclaving 15 psi at 120ºC±2 for 15mins. The agar solution was poured in petri dish and left to get to solidify. An amount of 5ml of peptone mater is taken in a test-tube to suspend the bacteria. The media which were poured in the petri dish were inoculated with the test organisms from the suspension using cotton. The sterile disc impregnated with 20µl of test extracts were introduced on the upper layer of the seeded nutrients agar plate. The petri dish was incubated at 37ºC±2 for 24 hrs. Then the inhibition zones were recorded.

**Screening for Antimicrobial Activity against the test micro-organisms:**

It is performed by Disc Diffusion method (Bauer *et al.*, 1966). Sterilized paper discs (6mm in diameter) were impregnated with known amount of the test substances in methanol (40µl/ml) using micropipette and the residual solvents are completely evaporated. Disc containing the test materials (20µl/ml are placed on the nutrient agar medium uniformly seeded with the test microorganisms. The plates are kept at 37ºC±2 for 24 hrs to allow maximum growth of the organisms. The test materials having antimicrobial activity inhibited the growth of the micro-organisms and a clear, distinct zone of inhibition was visualized surrounding the disc. The antibacterial activity of the test agent is determined by measuring the diameter of the zone of inhibition.

**Results and Discussion**

Out of 4 tested plants extract i.e *Houttuynia cordata* Thunb., *Zanthoxylum acanthopodium* DC., and *Pimpinella hastata* C.B.Clarke, *Eryngium foetidum* L. for antimicrobial activity, 2 species showed antibacterial activity by inhibiting test microorganisms i.e *Bacillus cereus* and *Shigella sonnie*. 
Table 45: Zone of inhibition formed against the test organisms by the disc containing medicinal plant extracts.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Test organism</th>
<th>Diameter in zone inhibition in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Houttuynia cordata</td>
</tr>
<tr>
<td>1.</td>
<td>Bacillus cereus</td>
<td>–</td>
</tr>
<tr>
<td>2.</td>
<td>Shigella sonnie</td>
<td>–</td>
</tr>
</tbody>
</table>

In this present observation, various diameter of inhibition zone are exhibited by the plant extracts against the test organisms. Based on the results of the present investigation it is clear that among the four plants investigated two of them have antibacterial properties against human tested pathogenic bacteria and they are formed from mild to moderate zone of inhibition area. The inhibition zones of the selected plant extracts against test organisms are recorded. *Houttuynia cordata* Thunb. shows no inhibition zones against *Bacillus cereus* and *Shigella sonnie*. *Zanthoxylum acaanthopodium* DC., showed the highest 11mm of inhibition zone against *Bacillus cereus* while there is no inhibition zone against *Shigella sonnie*. *Pimpinella hastata* C.B.Clark shows no inhibition zone against *Bacillus cereus* whereas it showed highest inhibition zone of 14 mm against *Shigella sonnie* (Plate-29: a-b & Table-45). However, in the present work there is no inhibition zone in *Eryngium foetidum* L. against both the organisms i.e. *Bacillus cereus* and *Shigella sonnie*. The result of antibacterial activity against the tested human pathogens are given (Table-45)

Choe, (1986) reported decoction of dried stem of *Cyperus rotundus* L. by agar plate method was active against *Shigella sonnie* but found inactive against *Bacillus subtilis*. There is no inhibition zone of *Eryngium foetidum* L. against both the organisms i.e. *Bacillus cereus* and *Shigella sonnie*. Leaf essential oil of *Allium sativum* L. by agar plate was inactive against *Bacillus cereus*, *E. coli* and
*Staphylococcus aureus* (El-Keltawi et al., 1980). *Bacillus cereus* has been recognized as an agent of food poisoning since 1995.

In ethnomedicine *Eryngium foetidum* L. is used to treat burns, earache, fever, hypertension, constipation, seizures, asthma, stomach ache, snakebite, malaria, infertility complication (Mohd Amin shavadi et al., 2012). *Eryngium foetidum* L. is strongly flavoured and pungent and it has been established by some researches that the more aromatic herbs exhibits greater antimicrobial properties (Herasa& Takemasa,1988). *Houttuynia cordata* Thunb. has been used traditionally to treat various types of infections, inflammation, hypertension sinusites, pulmonary tuberculosis. It has been used as an anti-inflammatory agent for treating atopic dermatitis and ace in traditional Korean herbal medicines (JeeYoung choi, 2010). *Zanthoxylum acanthopodium* DC. has been used to heal toothache and stomach ache(Suryanto et al., 2004). The multifarous use of the plant in traditional medicine suggests they represented an economic and safe alternative for the treatment of infection.

In conclusion, it can be suggested that the results of the present work supports the traditional usage of the studied plants and suggest that some of the plant extracts posses compounds with antimicrobial properties that can be further explored for antimicrobial drugs development. This antimicrobial study of the plant extracts can be effective more of a modern medicine to combated pathogenic micro-organisms.
General discussion

The present work was carried out on the topic ‘Ethnobotanical study of Kom tribe of Manipur, India’. Regular field survey was carried out season-wise in various Kom-inhabited villages. They are mostly settled in hillslope and traditionally live in forest since time immemorial and conserve the plant diversity. In the course of exploration thirty (30) villages were visited. In the present study 320 plant species belonging to 239 genera distributed in 102 families were found to be used by the Kom tribe for meeting their multifarious purposes in their day to day life.

Of the 320 plant species, 253 belong to Dicotyledons, 59 belong to Monocotyledons, 3 species under Pteridophyte, 3 species belong to Fungi and 1 each to Gymnosperm and Algae have been collected and documented. Of these plants utilized with respect to the habit, 12 plants are herbs, 47 species of shrubs, 81 species of trees, 20 species of climbers and 6 species are grasses.

Among the Monocotyledons plant species, Zingiberaceae represented the maximum of 15 species followed by Poaceae and Liliaceae each with 8 species, Araceae and Orchidaceae with 7 species, Areaceae, Dioscoraceae with 2 and the rest 7 families represented by single species. Among the Dicotyledons plant species Asteraceae represented the maximum of 18, Fabaceae 14, Lamiaceae, Verbenaceae and Euphorbiaceae with 11, Solanaceae 9, Rubiaceae 8, Rutaceae, Cucurbitaceae, Apiaceae, Malvaceae, Moraceae with 7, Rosaceae, Polygonaceae, Lauraceae, Acanthaceae, with 6, Mimosaceae, Caesalpinaceae, Fagaceae, Clusiaceae, Apocynaceae, Convolvulaceae with 4, Vitaceae, Myrtaceae, Flacourtiaceae, Anacardiaceae with 3, Meliaceae, Brassicaceae, Sapindaceae, Tiliaceae, Caryophyllaceae, Theaceae, Magnoliaceae, Urticaceae, Piperaceae, Menispermaceae, Combretaceae, Myrsinaceae and Juglandaceae with 2 and rest 41 families represented by single species.

Out of 8 plant species used as fuel, wood of *Pasania pachyphylla* Schott., *Pasania spicata* Oerst. and *Quercus serrata* Thunb. are widely used as a source of
fuel wood for cooking and the charcoal obtained from this species are in high demand.

Out of 15 Socio-religious plants Mesua ferrea L., Zingiber cassumunar Roxb. Thysanolaena latifolia (Roxb. Ex Homen) Honda and Erythrina arborescens Roxb. are being maintained by the Kom tribe for cultural value. Leaves of Machilus gambli King ex J.D. Hook. is used for exorcism in case of frequent unnatural death or accidental death in the village. To ward off evil spirit Thysanolaena latifolia (Roxb. Ex Homen) Honda. along with the leaves of Schima wallichii are dipped into the blood of the animal which was killed after the birth of a child. This blood stained plants are kept in a pillar at the corner of the house. They do not pluck the inflorescence of Phlogacanthus thyrsiflorus (Roxb. ex Hardw.) Mabb. on a Sunday during noon time as they believe the efficacy of the plant will be spoilt. Leaves of Ficus benghalensis L. are made like the structure of a Kei (paddy storing large basket). This is filled with paddy and offer to Goddess before thrashing. The Kom tribe believed that this will increase the yield of the paddy. Most of these orient cultural and religious practices are new ones of their kind and help in conserving the biodiversity.

Rout (2007) reported 19 species of wild edible fruits eaten in various ways in Orissa. Renchumi et al., (2011) also reported 98 wild edible fruit plants of Dimapur District. Similarly the present study also reported 35 wild edible fruits plants belonging to 26 families.

A total of 98 wild edible plant species are found to be used in various ways. Some were found in wild, some in Jhum fields, while some in their home gardens. Every house hold collect wild vegetables and maintain the areas where it grows. Wild plant products (tubers, leaves, flowers, fruit, seeds etc.) provide considerable quantities of food to the Kom people. Usually, flowers, and fruits are consumed in raw state, while tubers, leaves and seeds are utilized in cooked form. Among the wild edible plants collected, there are 3 fungi Auricularia auricular L., Lentinula edodes
(Berk.) Pegler and *Schizophyllum commune* Fr. which are collected for their own consumption as well as selling in the local market and thereby generating a supplementary income to their household economy. Singh *et al.*, (1998) claimed 46 wild edible plants used by the different ethnic groups of Manipur. Binu (2010) also reported 41 species of wild edible plants used by the tribals of Pathanamthitta districts.

A total of 30 plant species are also found to be used as spices. Majority of the spices are from herbs except a few are from tree and shrubs. Some plant species such as *Elsholtzia blanda* Benth., *Litsea cubeba* (Lour.) Pers., *Houttuynia cordata* Thunb., *Ocimum americanum* L., *Elsholtzia communis* Benth. etc are in great demand in the local market for their medicinal value. Rhizome of *Curcuma aromatica* L., *Curcuma domestica* Val., *Zingiber cassumunar* Roxb. not only added flavor but added colour and aroma to food. Leaves of *Eurya acuminata* DC., *Eryngium foetidum* L. are a must in meat curry. Besides, the above, *Eurya acuminata* DC. is most commonly eaten to increase haemoglobin level. Sumitra *et al.*, (2013) reported a total of 38 spices of plants used by the *Tangkhul* Naga tribe of Manipur.

Kom tribe still uses natural plant dyes for imparting different shades to their clothes. A total of 8 plant species are used for dyeing purposes. Sharma *et al.*, (2005) reported 34 plant species used by the Meitei community of Manipur. Akimpao *et al.*, (2005) reported 18 dye yielding plant species from Manipur.

A total of 278 medicinal plants have been documented for its medicinal value. They used various types of herbs, shrubs and trees available in their surroundings for their treatment, since they have considerable knowledge about them. On the basis of the available data, it is seen that the plants of herbaceous habit are the commonest to be used by the Kom tribal people. They have developed their own methods for preparation and mode of application and administration for every drugs, they used in their common ailments by using it regularly for sufficient period of time. A large number of medicinal plants used by the different ethnic groups of the country are

A total of 22 plant species are used for treating diarrhoea and dysentery. Chaudhury et al., (1996) reported 42 folklore medicinal plants for treating dysentery and diarrhoea. Aloe barbadensis Mill., Areca catechu L., Melastoma malabathricum L., Sapindus emarginatus Val., Solanum anguivi Lam., Caesalpinna crista L., Eryngium foetidum L. and Vitex trifolia L. are used in the treatment of Toothache and as toothcare. Some of the plants like Aloe barbadensis Mill., Litsea cubeba (Lour.) Pers. are used by the Sangang village people for providing instant relief from toothache.

For the treatment of stomach trouble, 37 plants species are used. These people use the maximum number of plants for stomach disorders. Ballabh & Chaurasia (2009) reported 57 plant species used in the treatment of stomach disorders by the Boto tribal community of Ladakh. Kagyung et al., (2010) reported 44 plant species in the treatment of gastro intestinal disease. Powdered root of Cissus adnata Roxb. as well as seeds of Hibiscus abelmoschus L. are used as antiseptic.

For treating diabetes, 23 plants are used by the Kom tribe. Khan et al., (2010) reported 54 plant species in treating diabetes by different ethnic communities in Thoubal district of Manipur. A total of 28 anti-diabetic plants are reported by Rana et al.,(2000). Jaundice is treated by using 10 plant species. Zehneria scabra L., Pavetta indica L. and Scoparia dulcis L. are the most commonly used plants in the treatment of jaundice by the Kom tribe. Rao et al., (2007) also reported 9 plant species in the treatment of jaundice. A total of 21 plants are used in the treatment of piles.
A total of 8 plants species are used in the treatment of Asthma. Noumi, (2010) recorded 29 plants used by the Mbo community of Nkongsamba in the treatment of Asthma. A total of 21 plant species are used in the treatment of urinary and kidney stone. Prachi et al., (2009) claimed that 15 plant are used in the treatment of urinary and kidney stones. 21 plant species are used for curing cold and cough. For getting relief from fever 15 plant species are used. For the treatment of urinary tract infection 4 plant species are used while tonsillitis is treated with 9 plant species.

Due to the constant association with the environment and with the passage of time, Kom people have developed a good deal of knowledge on the use of plants and plant products in curing various women related problems. A total of 27 plant species are traditionally used by Kom tribe of Manipur for the treatment of various diseases and disorder related to gynecological problems. Singh, (1996) reported 19 plant species in the treatment of gynecological problem by Meitei community. Skin diseases are treated by using 31 plant species by the Kom tribe. Nisha & Sivadasan (2007) reported 62 plant species to cure skin diseases. Nath et al., (2011) also reported 34 plants used in skin disease by the Dimasa tribe of Barak valley. Arthritis and muscle pain are treated by using 13 plant species. Sutha et al., (2010) reported 50 plant species for the treatment of rheumatism and 9 plant species used as an insect repellent.

Minor cuts and injuries are unavoidable as they are continuously exposed to forest environment. Cuts and wounds are treated with 31 plant species. Singh et al.,(2013) also reported 104 plants species in the treatment of boils, ulcer by scheduled caste community of Andro. The Kom tribe use as many as 16 plants for their tonic effect e.g. *Solanum nigrum* L., *Alangium chinensis* (Lour.) Rehder, *Cinnamonum verum* Prest., *Tectona grandis* L.,*Smilax perfoliata* Lour., *Citrus medica* L., *Curcuma angustifolia* Roxb., *Curcuma caesia* Roxb., *Dioscora bulbifera* L., *Oroxylum indicum* Vent., *Oxalis corniculata* L., *Mucuna bracteata* DC., etc. For the desired effect, these plant extracts are mostly given to the patient for a period ranging from several days to months.
Livestock play a very important role in the livelihood of the Kom tribal people. By tradition most of them keep livestock in small scale as subsidiary occupation. In celebration, ceremonies and feast of any occasion the domestic animals are sacrificed. So well being of their animals is of paramount importance to them and for their treatment, they use as many as 28 plant species. Galav et al., (2007) reported 33 plants species to treat 20 diseases of the domestic animals in Rajasthan. Tiwari et al., (2010) also reported 23 medicinal plants in the treatment of disease of domestic animals. Satapathy (2010) reported the uses of 82 plants species for veterinary medicine.

Contact therapy is one of the common practices of the Kom tribe. It is applied for curing various ailments of their people. In this therapy a part of the plant/ whole plant is made to touch the body of the patient or hung around the different parts of the body to get rid of their physical problem. Argyreia nervosa (Burm.f.) Boj, Basella alba L., Hedyotis scandens Roxb. and Stephania hernandifolia (Wild.) Walp. are commonly used as contact therapy by them. Sen and Behera (2007) reported 12 plants used in touch therapy at Bargah district of Orissa.

A total of 7 plant species are used as fish poison. Juglan regia L., Millettia pachycarpa Benth. and Pasania spicata Oerst. are the best species used for catching fish by applying extract of the plant parts in slow flowing streams, ponds and even rivers.

As many as 8 orchids are found in the study area, Dendrobium chrysanthum Wall, Dendrobium densiflorum Lindl., Dendrobium transparens Wall.ex Lendl., Coelogynae stricta(D.Don) Schltr., Rhynchostyllis retusa(Wall. Ex D.Dietr)A.D.C, Vanda coerulea Griff. Ex Lindl., Vanda stangeana Rohb., Vanda tessellata Hook. Ex G.Don . The People of this area have a tradition of conserving wild orchids in nature based on their use in various religious belief and health care.
A total of 8 plants species viz, *Arundo donax* L., *Dendrocalamus hamiltoni* Nees et Arn., *Euphorbia nerifolia* L., *Hibiscus schizopetalous* (Boulg.) Hook., *Lantana camara* L., *Musa paradisiaca* L., *Phlogocanthus thyrsiflorus* (Roxb.ex Hardw.) Mabb., and *Pyrus pashia* Buch.- Ham. are grown as hedge plant surrounding their huts. These hedge plants mainly serve as a boundary for the prevention of other animals, to keep away snakes and other poisonous animals from getting into compound and finally to keep away any evil spirit from huts and villages. Among the biofencing plants *Lantana camara* L., *Musa paradisiaca* L. and *Phlogocanthus thyrsiflorus* (Roxb.ex Hardw.) Mabb. are considered as the most useful to their day to day life for daily consumption as well as for medicinal purposes. Out of the 12 plant species used for hair care *Thingsangma* (*Ageratum conyzoides* L.), *Microtaena patchouli* (Clarke ex Hook.) Wu Hsuan are the only 2 species are mostly used most commonly by the Kom women from the time immemorial until now, to keep their hair strong, shiny and healthy.

Phytochemical screenings of some selected medicinal plants have been done. Alkaloid was found in trace amount in *Eryngium foetidum* L., *Curcuma montana* Rosc., *Curcuma leucorhiza* Roxb., *Pimpinella hastata* C.B.Clarke, *Plantago erosa* Wall. and *Zanthoxylum acanthopodium* DC. while alkaloid was found totally absent in *Houttuynia cordata* Thunb. and *Alpinia officinarum* Hance,. Medium quantity of Saponin was found in *Eryngium foetidum* L. and *Curcuma montana* Rosc. while trace amount of Saponin was found in *Alpinia officinarum* Hance *Curcuma leucorhiza* Roxb., *Houttuynia cordata* Thunb., *Plantago erosa* Wall. and *Pimpinella hastata* C.B.Clarke. Saponin was found to be absent in *Zanthoxylum acanthopodium* DC. Tannin was found to be present in all the seven plants species out of eight selected plants except in *Curcuma leucorhiza* Roxb. Trace amount of flavnoid has been found in *Alpinia officinarum* Hance, *Plantago erosa* Wall. and *Curcuma leucorhiza* Roxb. followed by moderate quantity of it in *Eryngium foetidum* L., *Houttuynia cordata* Thunb., *Curcuma montana* Roxb., *Pimpinella hastata* Roxb. and *Zanthoxylum acanthopodium* DC.
The antimicrobial activity of *Houttuynia cordata* Thunb., *Zanthoxylum acanthopodium* DC., *Pimpinella hastata* C.B.Clarke and *Eryngium foetidum* L. are examined against two human pathogenic bacteria i.e. *Bacillus cereus* and *Shigella sonnie*. *Houttuynia cordata* Thunb. shows no inhibition zones against *Bacillus cereus* and *Shigella sonnie*. *Zanthoxylum acanthopodium* DC. showed the highest inhibition zone of 11mm, against *Bacillus cereus* while there is no inhibition zone against *Shigella sonnie*. *Pimpinella hastata* C.B.Clarke shows no inhibition zone against *Bacillus cereus* whereas it showed highest inhibition zone of 14 mm against *Shigella sonnie*.

Besides these, there are as many as 35 plant species recorded as new additional ethnobotanical uses(*) by Kom tribe of Manipur under study. These plant species will be a significant contribution towards the knowledge of ethnomedicine which deserve worthy of scientific scrutiny.