INTRODUCTION
India is on the verge of progress, but the multifarious problems stand as a barrier in the right progress of the country, out of many fold problems "Food" stands as an important item.

In our country more than 70% of the people live in villages and most of them fully depend on agriculture. It is a common feature among these people that they take their staple food (viz: Rice, Ragi, Maize etc.) along with salt and a little amount of leafy vegetables (sag). These leafy vegetables are either procured from their vegetable garden on the back side of their cottages, huts or collected from the natural environment. There is no alternative for them as they are very poor and hence they cannot afford to go for costly vegetables, pulses, fishes, eggs, meat etc., in their daily meal. The natural
Occurring edible flora may be annual, biennial or sometimes perennials. All of these flora are non-cultivated. The matured seeds of these flora fall on the soil and remain dormant for pretty long time. They start germinating and give rise to full fledged plants during favourable seasons. Different flora sprout in the bulk of the paddy field, fallow land, river bed etc., in different seasons. These flora are also sometimes sold in the market and people use them by preparing different types of palatable dishes. The use of this naturally occurring flora is mostly seen among the people of Orissa, Bihar and Bengal.

Sometimes it is seen that the daily labourers and tribals of different parts of India while returning home from their daily work are used to collect these leafy vegetables from the natural environment. They are all edible weeds. Viz: Cassia tora L., Euphorbia hitra L., Boerahavia diffusa L., Bajania purpurea L., Bajania Variegata L., Amaranthus spinosus L., Marsilia quadrifolia, Eclipta alba L., Bacappa sps. L. etc. These commonly edible weeds are the source of many
nutrients which are essential for one's growth and development. (Patnaik et al. 1972 - 1989)

For the actual progress of India, the rising and upliftment of the standard of rural people is barely needed, because all the people are not properly nourished with rich & balanced diet. So if the amount of nutrition needed for the normal development of a man can be supplemented by any alternative source, then the problem of India may be solved to a certain extent.

The plants occupy the most important role on the surface of the earth in respect of their natural phenomena and utility. The natural phenomenon affords elements relating to mind of the human being whereas the utility aims at keeping of the body and physique.

According to Charaka, renowned naturalist of our gloriest past, plants are the origin of all sorts of
medicines. The details of his studies have been depicted in his famous volumes "Charaka Sanñita". The roots, stems, leaves, flowers and fruits of all plants occupy vital role in preparation of drugs in different kinds of medicines.

Besides medicinal properties, plants have properties for preparation of Carbohydrates, Proteins, Amino acids, Vitamins, Fats and many other food stuffs which are essentially required for animals and human beings for their growth and development. Those plants have got both curative and protective elements which can never be denied.

The herbal medicinal practices is ancient to Indian Culture. It found its nascent origin in the "Ayurved" advocated by the Hindu sages. From time immemorial practioners in different parts of the country are successfully curing of the diseases by ayurvedic methods.
But very little headways have been made in understanding the active principles behind the medicinal applications along with their nutritive values of those naturally occurring plants grown in our environment.

The people of primitive ages were using plants from religious point of view and were guided by superstitions. They were subjected to "Hukums" of professional people. They were quite ignorant of the medicinal values of the plant but modern scientists have revealed the truth underlying in different plants through their experiments in finding the components and the properties. This has changed the total outlook of people in common giving a blow to the speculations and superstitions to the primitive outlook.

In nature, the availability of various types of plants and animals and their interdependent principle is well known to us. The human beings not only depend on
various types of flora for their food, shelter and clothings, they also depend on them for medicines. In ancient ages, the sages and hermits living in dense forest could know the secret of certain plants which are responsible for curing many diseases and ailments of men and animals. With passage of time, it is felt that plant somehow has got some medicinal properties. Though Vedas and Puranas provide us knowledge regarding the utility (Medicinal and food values) of various plant species, but these ideas have been wiped out from the mind of modern age people due to lack of their proper use, as we are getting alternative sophisticated allopathic medicines in our civilized and progressive scientific age.

Due to disturbances in our ecosystem (i.e. rapid urbanisation, deforestation, development of various types of industries, development of Dams and Projects etc.) many a plant sps. are showing their threatening behaviour, many of them are getting extinct. This creates
hazardous problems for our living society. But now the people are again becoming conscious and are realising the utility of forest and are taking serious efforts to keep up the balance and preserve each flora and fauna for our better living. The most civilized and developed as well as developing countries of the world are now in search of plants of economic importance and more so, of their food values and medicinal implications etc.

Taking into consideration the knowledge of Indians on uses of various herbs, shrubs and trees for different purposes of their benefit, we will find that in India the medicinal use of plants are found from the earliest days. Ancient Hindus contributed to the enrichment of the Indian materia medica and large number of vegetable and other products came into use for the treatment of diseases. But now-a-days our researchers, scientists and practioners are doing continuous experiments to find out the medicinal as well as nutritive values of commonly
occurring edible weeds and non-cultivated edible & useful plants growing in various environmental conditions. The habit of these plants may be hydrophytes, xerophytes or mesophytes. The previous experimental results indicate that the commonly growing edible weeds having certain nutritive values which may help the people to supplement their food (Patnaik et. al 1972-89). So if the amount of basic nutrition viz. protein, essential amino acids, vitamins, minerals etc., needed for the normal development of a man can be supplemented by any alternative and less costlier source, then the problem of India may be solved to a greater extent.

The search for food sources from sea (which occupies 2/3rd area of the earth) by the modern scientists is the main object for human being living in this globe. However, the scientists of different countries are trying with tooth and nail to solve the major problem for energy and food for living being since
our natural environment is on the verge of destruction due to environmental pollution.

Also many a civilised countries of the world is now in search of plants of economic importance and more so, of their medicinal implications and nutritive values. In a poor and rural economy "Ayurved" no doubt provides better facilities and amenities to eradicate several diseases. Under these circumstances there is an increasing necessity for continuation of research programme on indigenous drugs. As per example Atropa belladona L, had been widely used as a stimulant to the sympathetic nervous system as diuretics in dilating the pupil of eye and in the treatment of palsy. "Reserpine" is an alkaloid derived from the root of Rauwolfia serpentina which is extensively used in the treatment of violent kinds of insanity and high blood pressure.

The synthetic preparation of drugs which required a huge quantity of heat, chemicals and man power etc., can be avoided by direct application of herbs. However,
the herbal medicine can be prepared with relatively less labour and simple methodology. As per example the alkaloid ephedrine obtained from several sps. of Ephedra, can be used in the treatment of nasal and bronchial congestion, cold and asthma instead of preparing that alkaloid synthetically in laboratory. The vegetation and man are the part of Nature and exhibit symbiotic relationship for which they are quite inseparable in their existance. In the course of interaction and inter-relation between flora and fauna about 3000 plants have been used as food purposes by the man and about 200 of those plant sps. have been domesticated. According to Mangelsdraf's word - "those plants in true sense stand between mankind and starvation". As the agricultural practices were expanded the human society themselves were transformed by the new relations with plants which are growing in their natural environments. Due to the high growth rate of our world population, the shape of our future will depend on our understanding and relationship with these plants and plant products by the interplay of scientific
knowledge and outlook that brings the comfort and well being to life itself by unfolding truth of nature and its various manifestations.

The major challenging task of ever increasing global food supplies along with unsurmountable task of controlling population explosion appears to be a paramount incentive for the research on the use of plant kingdom.

As the world population is running it will surely reach to 7 - 8 billions at the fag end of the 2000 years which will surely exert heavy pressure on the yearly food stock production. Various types of diseases are also associated with the population pressure since we may need food but may not provide high amount of calorised food like food which is provided with protein Aminoacid, Vitamins, Carbohydrate and Mineral. Due to constant malnutrition with human society especially with infants and ladies during pregnancy, demands for more
food for their existence is inevitable. The animal product on one hand is not possible to get easily every day as it is on the verge of scarcity, so it is better on the part of man to switch over from animal product to naturally occurring green plant products.

About 3000 years ago Herbew said "Iseih "wrote" all flesh is grass and all flesh is still grass and weeds, since milk and meat which come from cattles, sheep, goats, thou generally depends on grasslands".

For which, the scope of leafy vegetables as a source of protein, carbohydrate, vitamins become more prominent for bridging the gap of these above nutritional factors within the requirement and intake at a feasible economic plan.

In the modern scientific world much research has been done on various herbs, shrubs etc., and many active principles have been isolated from various flora.
Although certain achievements have been carried out with respect to their nutritive values, still then there are many other plants which have been overlooked. Though various types of plant sps. are growing luxuriantly in hilly and plain areas still then we are not aware of their nutritive values. For example, it is an established fact that plants belonging to leguminoceae family have got comparatively more of protein and nitrogenous compounds than other families, many other edible leguminous plants growing in forest have not yet been taken up for further studies.

However, during recent years, considerable progress has been made in the direction of preparation of refined chemicals for medicinal purposes from crude extracts of flora and fauna. Besides certain research findings are also being made to ascertain how the various parts of different herbs, shrubs and tree can be utilized for the food purposes by our common people especially those who remain below poverty line. Government of India
now, through its various research organisations like C.S.I.R., I.C.A.R., I.A.R.I., C.R.R.I., Botanical survey of India etc., are sponsoring various programmes for plantation and rapid cultivation of these useful plants which meet the food and medicinal requirement of rural poor people. In Orissa too, the State Government (Department of Science, Technology & Environment) is operating various research projects on rehabilitation of these useful plants which will meet the day-to-day basic needs like nutritional problems as well as medicinal requirements of the people along with very many other programmes. This above Department of Government of Orissa is also encouraging our investigators by providing funds to work on environmental awareness and preservation of economically important plants etc.

The States like Orissa, Bihar, Himachal Pradesh etc., are still provided with comparatively thick, bushy forests. These forests are rich in various flora and fauna. Starting from the Northern Himalayas to the
Kanyakumari we come across thick vegetations, which is the pride of India. In India, Orissa is a State where most of its parts like Koraput, Kalahandi, Phulbani, Mayurbhanj etc., have full of forest areas and the local people are mostly tribals. These tribals fully depend upon the forest products for their food and medicines.

WORLD FOOD SUPPLY.

Against the menacing growth rate of world population the mankind has to solve its problem of food for its survival. So far as food is concerned, it is made available from crops and animal relative to the constraint of water, land and fossil energy. Against the high diminishing rate of animal protein, fat, vitamins etc., ultimately alternative source of nutrition potentiality from plant resources have to be made more by technologically agricultural system within the constant frame work of land.
If we look at the possible world for protein supply, mainly three major type of resources are at hand at present i.e. (i) animal protein (ii) protein from fossil energy (iii) vegetable protein. The WHO's statistical year book and FAO year book suggests the relative importance of various animal products and fish as a source of protein for the man. The crop plant provides atleast 2/3 of dry weight and half of the protein in the World diet.

<table>
<thead>
<tr>
<th>Legumes and Seeds</th>
<th>Dry matter Metric tons x 10^7</th>
<th>Protein Metric tons x 10^7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soyabean</td>
<td>4.2</td>
<td>16.7</td>
</tr>
<tr>
<td>Peanuts</td>
<td>0.6</td>
<td>4.8</td>
</tr>
<tr>
<td>Peas</td>
<td>0.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Beans</td>
<td>0.5</td>
<td>5.4</td>
</tr>
<tr>
<td>Cottonseed</td>
<td>2.0</td>
<td>7.2</td>
</tr>
<tr>
<td>Fibre</td>
<td>0.1</td>
<td>12.4</td>
</tr>
<tr>
<td>Other Vegetation</td>
<td>3.5</td>
<td>8.0</td>
</tr>
<tr>
<td>Fruits</td>
<td>2.5</td>
<td>1.3</td>
</tr>
</tbody>
</table>

**ANIMAL PRODUCTS:**

| Milk                   | 5.2                           | 14.5                       |
| Meat                   | 2.8                           | 12.6                       |
| Egg                    | 0.5                           | 2.5                        |
| Fish                   | 0.7                           | 8.5                        |
About life, edible dry matter is protein on the basis that 10-12% of diet calories should come from protein. And that about 6% may be sufficient in adult diets, the proportional protein in the world diet is adequate though it may not be shown in the area where the diet consists mainly of low proteinaceous food, such as rice or the starchy roots. So alternative source of protein is likely to play an important role in future. The above fact suggests that man's dependence on major crop plants for his energy and protein is likely to decrease in coming future.

**ALTERNATIVE SOURCE OF PROTEIN :**

With a view to cater the need of proteins now-a-days our scientists have to give a new word of thinking for possible alternative for the protein in future from plant resources in proper perspective by collecting the data obtained in earlier work in anthropology, history, agriculture, chemistry and biochemistry.
Calder (1967) concluded that agriculture is simply failing us and will need to be replaced by synthetic methods of food production as McPherson (1965) has argued. Calder (1967) Pyke (1970) suggested that it is not possible to synthesise carbohydrate, protein, mineral vitamins, aminoacid etc., on large scale by use of solar or nuclear energy.

Protein helps the tissue building of the organisms and so its requirement is barely necessary to the diet of human being. The primary requirement of protein is for the supply of the energy. The nutrient inadequacy in caloric content shall make some of the protein components to be converted into a source of energy so deviating from its principal function of growth. Protein in addition to the formation of tissues of the body also forms flesh, blood etc. All biochemical metabolites needed for the biochemical reactions and synthesis of new substances maintain its growth process. It's inadequacy in diet results in the reverse process of
growth of the body. As per the data published by FAO, the present quantity and quality of food supply in India is very low as compared to the other countries as shown in the following table.

<table>
<thead>
<tr>
<th>Country</th>
<th>Calories</th>
<th>Protein (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USSR</td>
<td>3542</td>
<td>108.0</td>
</tr>
<tr>
<td>USA</td>
<td>3504</td>
<td>104.3</td>
</tr>
<tr>
<td>Europe</td>
<td>3420</td>
<td>94.9</td>
</tr>
<tr>
<td>Asia</td>
<td>2233</td>
<td>57.8</td>
</tr>
<tr>
<td>Africa</td>
<td>2212</td>
<td>56.3</td>
</tr>
<tr>
<td>India</td>
<td>1971</td>
<td>48.1</td>
</tr>
</tbody>
</table>

Protein and caloric malnutrition are interrelated, because as "Althschul" pointed out "a protein, caloric trade off". That is if the body faces a caloric deficiency it will convert protein into calories but the reverse is not true. So it is clear that when caloric intake is inadequate, the protein deficiency occurs.
It is quite evident that though animal proteins are of higher nutritional value, which is composed of relatively large amounts of the eight essential aminoacids but at the same time there are some plants which are provided with all essential aminoacids like that of egg, fish, milk etc. Also valuable minerals, vitamins are provided with these plants. At the same time the digestibility of all these proteins are 100 percent.

Though rice, wheat and corn are low in lysine, there are plants which provid protein containing all essential amino acids composition of whole egg as the standard (100%) whole rice contain 52%, lysine whole wheat 44% and corn contains only 38%, where as soyabean meal contain 111% of lysine compared with the egg as standard. But certain members of family-ceasal-pineacae contain more or less 100% lysine.

Recently people of the world get 70% of their nutritional protein from cereals, vegetables and legumes.
of essential 122 million metric tonnes of protein available for World consumption in 1973, about 86 million metric tonnes are vegetable protein (47%) comes from cereal grains and this agrees with Roberts estimate of 50% legumes account for 20% of the protein available to the man ( ). So cereals and legumes account for the most of the protein and calories consumed by the majority of the people of the world where as in USA 69% of the protein is derived from livestock sources.

It can be presumed that sufficient amount of essential amino acids can be obtained from selected combination of cereals and other leafy vegetables which are used as food sources. Cereals and leaves of some plants under ceasalpineae family contribute nearly 47% of total protein supply. As per FAO data total animal protein constitutes about 25% of total protein (122 metric tonnes) supply that is estimated to be available to man. The 122 million metric tonnes would provide us average of 84 grms of protein per person per person per day where problems of losses to pests and
NUTRITIONAL VALUE OF PROTEIN:

It is a nutritional science which recognises requirements for nutrients and calories value describing the physiology consequences of eating unbalanced diets. Protein malnutrition can be solved by increasing protein content of the crop plant, as the energy is yield from Photosynthesis and this energy is mostly used up in the synthesis of carbohydrates. It has been ascertained that protein synthesis in plants requires twice as much energy expenditure as the synthesis of carbohydrate.

The IAEA Scientists agree that increasing the protein contents of the grains without decreasing the yield may be required for reaching changes in the plant metabolism.

The higher rate of photosynthesis needs more leaf
area, long period of photosynthetic activity or mobilization of energy resources into grain, accompanying with higher value of nitrogen input to produce additional grain protein. An increase in lysine concentration would mean a higher nitrogen utilization and greater nutritional efficiency.

Proteins are complex nitrogenous compounds present in all living cells and perform most important function of the cell. Some hormones regulate the metabolic processes and antibodies which are produced in the body fight the invading agents. It has been argued very often as to what has been considered a protein malnutrition problem more correctly is a total food problem in these terms. People not only consume inadequate protein, but also consume less of food.

The adverse effect of malnutrition left unattended is no doubt a very serious problem. During
the past decade since the production of pulse and other leguminous plants remain constant and stagnant, certainly it is not commensurating with the rise of population.

The proteins contain 5 elements carbon, nitrogen, oxygen, hydrogen and sulphur. Protein, the polymer of known 20 different amino acids arranged in definite sequence. The plant can synthesize 18 amino acids and two amides for the manufacture of protein molecules. Moreover, other amino acids have been reported to be present in low concentration in the higher plant whose evidence needs more investigation. Protein consists of polypeptide chain in which amino acids are joined by forming peptide bond NH-CO. This is formed by the amino acids condensation.

Amino acids are the structural units of proteins. It is the very essence of life, being needed highly during the growth and development. Deficiency in growth stage leads to some permanent and degenerative changes.
For this reason pregnant ladies, lactating mothers, infants, pre-school going kids, daily labourers etc., need adequate amount of good quality and quantity protein.

Amino acids are characterized by the possession of both amino group - \( \text{NH}_2 \) and acidic or Carboxylic group - \( \text{COOH} \). Due to presence of amino and Carboxyl groups amino acids are amphoteric. They are attached to a carbon atom, called L-Carbon atom (L-alpha - Leucine, isoleucine, valine, aminobutyric acid, alanine which are required for the synthesis of Plasma protein, (Harper, 1963). Some proteins also contain amides (i.e. aspargine glutamine). Every plant is able to synthesize twenty different amino acids. However, non-proteinous amino acids are limited in their distribution. They are usually found in some higher plants. Either they are present in free from or combined to form bipeptides which have low molecular weight, excepting in rare cases these amino acids do not take part in protein synthesis.

The general formula for all L-amino acids is \( RCH \)}
(NH₂)COOH, except glycine. All protein amino acids are optically active and they have L-configuration with respect to D-glyceraldehyde. However, the D-isomers of several acids have been isolated from cellular and antibiotic peptides of many micro-organisms. Depending upon the polarity of the -'R' group proteinous amino acids are of four types.

1) Amino acids with nonpolar or hydrophobic 'R' Group
2) Amino acids with polar but uncharged 'R' Group.
3) Amino acids with positively charged 'R' Group - basic.
4) Amino acids with negatively charged 'R' Group acidic.

The R-Group may include hydroxyl, aromatic or sulphur containing substituents. The synthesis of amino acids and amides depends on the status of the Carbohydrate in plant which is affected by light (Kreto-rich 1965).

There are number of amino acids which are never
found as constituent of protein but play important role in metabolic functions. L-ornithine and L-citruline are metabolic intermediate in Urea cycle and participate in the synthesis of Arginine.

These non-proteinaceous amino acids are usually related to proteinaceous amino acids as homologues or substitute derivatives.

Two properties of the amino acids provide information about their structure both in solid state and in solution (Cohn and Stumf). The amino acids with certain exceptions are generally soluble in water and are insoluble in nonpolar organic solvents like ether, chloroform or acetone. Another physical property of amino acid is that it has high melting point, but the melting point of carboxylic acids and amines are low.

The synthesis of an amino acid involves interesting pathway and it is connected with the Kerbs'
cycle and other pathway of general nitrogen metabolism.

It is reported that leucine, isoleucine, valine, aminobutyric acid, alanine etc., are required for the synthesis of plasma protein (Harper 1963) of the living system.

NUTRITIVE VALUE OF CARBOHYDRATE:

Carbon is one of the most important and characteristic elements of living organism. Predominantly for this reason, organic chemistry is the chemistry of carbon compound. Carbon atoms participate in the formation of almost infinite variety of molecules, because of the ability of carbon atoms to combine with one another to form long chains and double covalent bonds. Carbohydrates are such group of carbon compounds which are essential for life. Almost all organisms use carbohydrates as building block of cells and as a matter
of fact, exploit their rich supply of potential energy to maintain life.

Sugars may be classified as either reducing or non-reducing sugars. The reducing sugars which are more common are able to function as reducing agents, as they have potentially free aldehyde or ketone groups in the molecule. Examples are glucose, fructose, arabinose etc. Glucose has a free aldehyde group at C-1 and fructose has a free ketone group at C-2. So these two molecules combine at this functional group to form sucrose which has 1-2-\( L \)- glucosidic linkage.

Carbohydrates are generally divided into two main classes - Sugars and Polysaccharides. Sugars are crystalline substances with a sweet taste and soluble in water.

Sugars are subdivided into two groups:

i) Monosaccharides
ii) Oligosaccharides

iii) Polysaccharides

i) **Monosaccharides**

These are simple sugars that cannot be hydrolysed into smaller units under reasonably mild conditions. Their general formula is $C_nH_{2n}O_n$. The most simple monosaccharides are the aldose glyceraldehyde and its isomer is the ketose dehydroxy acetone. Both of these sugars are trioses, because they contain three carbon atoms. Monosaccharides are described not only by their functional group, but also by the number of carbon atom they possess. The important monosaccharides are the pentoses and hexoses and these are practically the only monosaccharides which occur naturally.

ii) **Oligosaccharides**

Oligosaccharides are hydroxysable polymers of
monosaccharides that contain 2 to 6 molecules of simple sugars. So disaccharides are oligosaccharides which on hydrolysis yield two molecules of monosaccharides.

iii) **Polysaccharides:**

As the name indicates it contains more than two monosaccharides. These are usually tasteless, insoluble compounds with high molecular weights. These are polymers of monosaccharides that may be linear or branched structure. Monosaccharides, that are bound together by glucosidic bond, form polysaccharides. The monosaccharides that take part in the formation of polysaccharides are glucose, xylose, arabinose etc. It is of two types:

A) Homopolysaccharides.

B) Heteropolysaccharides.

C) Homopolysaccharides: If the Polymer is made from a single monosaccharide

D) Heteropolysaccharides: If two more different monosaccharides are found in polymer.
The Amino acid and Carbohydrate contents of *Cassia tora* L. (Oriya - Chakunda) and *Bauhinia purpurea* L. (Oriya - Barada Sag) was analysed by partition paper Chromatography (two dimensional paper chromatography) and Circular paper Chromatography method. Of all the methods of paper Chromatography, the present method adopted in this laboratory with the help of which the present work has been done, is most popular one, because it does not require any sophisticated apparatus, except some filter paper, large closed chamber and a solvent container. Secondly it is also very effective to detect the compounds qualitatively especially the compounds like amino acids, sugars, glycosides, glucosides, oligosaccharides and also many other organic and inorganic ingredients etc.

Before the application of this technique, the determination of amino acids were very inadequate and
unreliable. The development of chromatographic method gradually changed the situation. Weil and Williams, Faradane (1960) and Zechmister (1956) gave early history of Chromatography by observing separation of substances by filtration through columns of finely divided absorbents.

However, modern chromatography is no more limited to colour separation when Reichstein introduced liquid and the following chromatogram (1938), Vickhery and Pucher made an analysis on organic acids of plants (1940). Above all Ranjan, Govindjee and Laloraya made chromatographic studies in amino acid metabolism of healthy and diseased leaves of Croton-sparsiflorous (1955). Finally Smith and Smith published the Chromatographic Techniques (1958).

The qualitative analysis of the mono and oligosaccharides were carried out by the well known paper chromatography method. It is popularly useful for
the separation of the fraction of mixtures, the isolation of unstable substances and the separation of closely related compounds according to their partition co-efficient (i.e. their relative solubilities) in between immiscible phases. The method of separation and identification of sugar meioty has been achieved as per the method adopted in Parija Laboratory of Botany, Ravenshaw College, Cuttack (Mishra and Patnaik - 1989).

The ratio of the distance travelled by the solute to the distance travelled by the solvent front from the point of application on the paper sheet is called Rf value of the compound. Under strictly controlled conditions the Rf value is an important constant for identification process. In paper chromatography different spots and bands are distinguished visually, if they are coloured, if not they are identified by spraying with specific reagent that reacts with the compounds chemically and produce a complex molecules which give different colour.
The Sparying reagent described by Buch and Savage (1952) was used here.

Different common sugars like glucose, fructose, sucrose, galactose, manose and some times Oligosaccharides present in plant extract which can be easily separated using circular paper chromatography method, is suitable enough to identify oligosaccharides and monosaccharides present in young Juvenile leaves of *Cassia tora* L. and *Bauhinia purpurea* L. which are used as leafy vegetables by the tribals.

Buchan and Savage have performed paper Chromatography on some starch conversion products (1952). Airan and Desai performed experiments to study sugars and organic acids in a *D. digitata* fruit (1954).

The solvent systems and developing method of two dimensional partition paper chromatography for amino acids, amides etc., separation and identification of those were done as described by Patnaik and Laloraya (1960). The identification of those were made from the calibration of individual amino acids and amides, done in Parija P.G. Laboratory of Botany (Behera and Patnaik 1976).

**CHLOROPHYLL:**

Chlorophyll in the green leaves play an important role to synthesis sugars in the process of photosynthesis. In order to draw the relation between the quantity of carbohydrates to chlorophyll distribution in the tissues of the material attempts were made to study the chlorophyll content of the leaf during three main season of the year (Summer, Rain & Winter). The quantitative estimation of chlorophyll was adopted as described by Nather et. al (1972).
During senescence there is a rapid trend from anabolism to catabolism (Kozlowski 1971). The disappearance of Chlorophyll and hydrolysis of leaf protein are two most frequently used criteria of senescence (Biswal and Choudhuri, 1978). In this investigation a comparative study of the quantitative distribution of chlorophyll corresponding to the synthesis of carbohydrates during three main seasons viz, Summer, Rainy and Winter was carried out. This experiment however, may give a clear picture of the carbohydrate synthesis and protein depletion into amino acids especially during senescence period of the leaf.

**F A T:**

The lipids (fat) are important constituents of the diet because of their high energy value, the fat soluble vitamins and the essential fatty acids found with the fat of the natural food stuffs. In the body, the fats serve as efficient source of energy which is
stored in the adipose tissues. The lipoproteins (Fat + Protein) are important constituents of the cell membrane of the human body. Hence the total fat content in the young, juvenile leaves of the experimental material was estimated as per the method adopted by Christil (1973) and Johnson & Davenport (1971).

**VITAMIN - C :**

The Vitamin -'C' (Ascorbic Acid) is water soluble and is the source of nutrition and plays an important role in the formation of tissue collagen and intracellular cement substance. It also appears to be essential to the activity of the enzyme Collagen proline hydroxylase, which catalyzes the conversion of Proline to hydroxy proline. Hydroxyproline is found exclusively in collagen and is vital in maintaining the tertiary structure of this major vertebrate protein (collagen) and plays a possible role as an anti-ageing agent. The deficiency of Vitamin-'C' scurvy is frequently observed in old age.
So attention has been given here to estimate the quantity of Vitamin-'C' present in young edible leaves during growing season. The estimation method was adopted as described by Padisc (1973).

**RESPIRATORY ACIDS:**

As all the plants undergo respiration starting from germination till senescence stage attention has been pinpointed to study the distribution of respiratory acids in the edible leafy tissues of the material by Chromatographic method. Besides, the percentage of titratable acidity present in young leaves of both these plants were also estimated. Emphasis has been given to study the seasonal variation of these acids of these materials.

**MINERALS:**

The leafy vegetables are provided with certain
minerals which are barely necessary for the growth and development of human tissues. Hence attempts have also been made to study the types of minerals found in the edible leaves of *Cassia tora* L. and *Bauhinia purpurea* L. by Flame photometric analysis method.

**MAIN REASONS FOR SELECTING THESE TWO PLANTS:**

*Cassia tora* L. (Oriya - Chakunda) The plant *Cassia tora* L., chosen for the present investigation, is not only used as leafy vegetables by common people of Orissa, Bihar and Bengal, but also used on medicinal purposes (Chopra - 1967). The earlier investigations have given their view regarding its medicinal properties and they are as follows:

The leaves are antipyretic astringent, and antihelmintic. They are generally given to children having intestinal disorders. The decoction is a mild laxative in doses of two ounces, especially for children
having fever while teething. They are given in skin diseases as an alternative.

A Poultice of leaves is applied to boils to force them to come to a head. It is also locally used in gout, sciatica and in joint. The leaves and seeds contain chrysophanic acid and so are very valuable for the treatment of skin diseases like ringworm, scabies, eczema etc. The leaf juice is applied as an emullient to inflammation.

The Paste of roots made with lime juice is a specific remedy for ringworms.

The seeds are tonic and stomatic but they are particularly used externally in skin diseases. They contain crysophanic acid and so have the same used in skin diseases as leaves, a paste made with curds is applied over the affected parts. The alcoholic extracts of the entire plant of Cassia tora L. was found to
possess anti-viral activity against ricket, virus and Vaccinia virus (Chopra R.N. 1967).

Although the medicinal properties of Cassia tora L. has been reported to certain extent, no attention has been given towards its nutritional values of such commonly occurring edible herbs growing in hilly region and so it is commonly used by tribals of Phulbani district mostly during rainy seasons.

**BAUHINIA PURPUREA L. (ORIYA - BARADA SAG):**

The detailed investigation and experimentation on young Juvenile leaves Bauhinia purpurea L. (Barada Sag) which grows wildly in the hilly region of Phulbani district, Orissa, (Boud, Manamunda, Raikia, Tikabali, Dutipada etc.) is used by the tribals during summer season. The Plant has got certain important economic values as follows:

i) The root of the plant is carminative
ii) The bark acts as an astringent in diarrhoea, its decoction is recommended as a useful wash in Ulcers

iii) The flowers are laxative

iv) The bark or root and leaves mixed with rice water are used as a maturation for boils and abscesses.

Such investigations have been tried in different countries of the World and in India and the work which has been postulated by C.S.I.R. New Delhi, must be taken into account.

Though much work has been carried out on medicinal aspects of plant parts, still then the work has not yet been undertaken to know its nutritional values.

In the view of the above, attempts have been made to study in detail the changes occurring in the nutritive value of the edible leaves of Bauhinia pupurea L. and Cassia tora, L. in three main seasons (Summer,
Winter and Rainy) in a year. Besides, a comparative study on the distribution of the important and essential organic ingredients as well as the minerals present in the tissues of the leaf of the above materials available in plane and hilly areas of Orissa was carried out. This investigation was aimed at to pin point the economic nature of the plant materials and more so their importance of uses as leafy vegetables by the common people at times and invariably by the tribals of Phulbani district.

**MINERAL SALTS:**

A large number of minerals are present in human body. Bones and teeth are made up mainly of calcium, magnesium, phosphorus, and iron is an important constituent of blood. Minerals like zinc, molybdenum and manganese are either constituents or activators of some enzymes. Sodium and potassium are important elements
present in the extracellular and intracellular fluids respectively. These elements along with other ions like chloride, carbonate and bicarbonate ions keep up the water balance and acid-base equilibrium in the body on an average a man excretes daily about 20 to 30 gms. of mineral salts, consisting mostly of chlorides, sulphates and phosphate of sodium, potassium, magnesium and calcium and this output must be made good by the intake through foodstuffs. In case of the growing body, provision must be made for additional amount of the elements to ensure adequate growth of the tissues. (Gopalan et. al. 1982)

Since intake of mineral elements are required for human beings' for their real growth and development, attempts have also been made to study both the quality and quantity of mineral elements present in such consumable leafy vegetables of Cassia tora, L. and Bauhania purpurea L.