CHAPTER - VI

SURVEY ON PRESENT DAY ETHNIC USE OF DIFFERENT SPECIES OF *Dioscorea* IN DARJEELING AND SIKKIM HIMALAYAS WITH SPECIAL INTEREST ON DIFFERENT HERBAL SYSTEMS OF MEDICINE AVAILABLE IN THE REGION

Introduction

The knowledge of herbal medicine that has come through generation verbally is the main subject of ethnobotany. The term "Ethnobotany" was first used by Harshberger (1885) and its scope was much elaborated later (Ford, 1978; Faulks 1958) Since then there has been a growing interest in the field (Jain 1986; Martin 1995) and has received much attention in certain parts of the world particularly in the underdeveloped and or developing countries where small or large proportion of population still depend on natural resources in particularly indigenous condition and the impact of modern system of medicine has not reached them. This subject assume great importance in enhancing our knowledge about plants grown and used by native tribal communities. There is no doubt that ethnobotany is a multidisciplinary science. In its totality the subject involve anthropology, sociology, botany and of course medicinal and economic botany (Jain 1981).

Botanically, the Darjeeling and Sikkim Himalayas may be said to be the richest source of medicinal and aromatic plants in India. Amongst the diverse floristic elements many plants are of religious, social and medicinal value. Their usage through the course of countless generations have rendered them to become indispensable part of culture of the people of the region, a sizeable population being comprised of the tribals.

The exhaustive floristic work in Darjeeling and Sikkim Himalayas was made by Sir J.D.Hooker during 1871-97, but he did not lay much stress on the healing properties of the indigenous medicinal plants. The most comprehensive work on medicinal plants in the region had to wait for many years (Biswas and

Chopra 1940; Biswas 1956). Later observation on ethnobotanical studies in the region have been published (Bennet 1983; Tamang and Yonzone 1982; Yonzone et al 1884, 1985). But all the authors so far attempted in this line of work, did not mention *Dioscorea* as traditional or tribal medicines in the region. Various ehtno medicinal use of different species of *Dioscorea* has been reported from Andhra Pradesh, India (Reddy et al 1998), Japan (Nakamura et at 1998) and Australia (Min et al 1998) but proper identification of the natural products responsible for their remedial activity has not been worked out

Recently Mulleng et al (1999) isolated linamarin, a toxic constituent for human and animal health from some economically important yam of *Dioscorea species*.

Since the discovery that diosgenin - a sapogenin could be used as a precursor for the synthesis of cortisone, progesterone and C21 steroidal oral contraseptives, much attention was given only on a limited number of *Dioscorea sp.* disregarding further investigation on purposeful utilisation of wild and traditionally important species of *Dioscorea.*

From survey it appears that though modern system of medicine is available in the region, different species of *Dioscorea* are still being used by different tribal communities as ethnomedicine and various purposes. Besides it has been observed that a number of systems of herbal medicine are still in vogue in the region.

This paper deals with a discussion on present day use of different species of *Dioscorea* by the local as well as tribal people with special emphasise on the past and present day status of different herbal systems of medicine in the region.

Material and Methods

Materials : Eight different species of *Dioscorea* have been taken into consideration. These are : *D.alata* L. (Ghartarul), *D.kamoonensis* Kunth (Bhyagur), *D. arachindna* (Bharlang) Prain & Burkill, *D.sikkimensis*, Prain & Burkill (Niltarul), *D. bulbifera* L.(Bontarul), *D. esculenta* Prain & Burkill, (Sutuni) *D. prazeri,* Prain & Burkill (Cucurtarul) and *D. sativum* L. (Githa).

Methods

Field Work

Intensive field work has been done among 15 different types of tribal population i.e. Lepchas, Sherpus, Bhutias, Kami. Dorji, Sarki, Sunar, Manager, Gurung, Ghate, Chettri, Bahum, Thakuri, Limbus and Rais available at fifteen different villages in Darjeeling district such as Tanek, Somalbung, Singi, Garubathan, Mansong, Khari, Samthar, Nangsonden, Lolley, Gitdebling, Shhibo, Suruke, Sindebling, Bunbusty, Bijanbari and seven villages in Sikkim i.e. Kerbari, Dentam, Ratomte, Singtam, Jorthang, Namchi, Rambhabung have been visited. Information on ethnomedicinal value of plants in the region has been collected from knowledgeable persons, medicine men and practisioner.

Literature

Some published and unpublished literature have been consulted for gathering information.

Herberia

Plants and their parts were collected and herbarium sheets have been prepared. these have been identified after comparing with those of authentic specimens inthe Central National Herbarium, Botanical Survey of India, Hawrah, West Bengal.

Results and Discussion

It is established that majority of *Dioscorea sp.* are distributed in tropical and subtropical region all over the world including India. During survey eight different species of *Doscorea* have been observed to be distributed mainly in the lower and middle hills in the region. It has also been observed that the region of Darjeeling and Sikkim Himalayas is occupied by the people belonging to different ethnic groups. It is apart from the three majot ethnics – Bhutia, Lepcha and Nepalese, a conglomerate of over 20 ethnic tribes and a still more number of subtribes (Rai and Sharma1996).

The climate in Northern part of Darjeeling and Sikkim Himalayas is dry and cold and most of the land is having with higher altitude which is beyond the range of monsoon resembling arctic region. In Southern part of the region the climate is damp and warm at lower altitude such as is encountered in the tropical region. It is not surprising therefore that distribution of *Dioscoea sp* and thick population of different tribal people are concentrated mostly in such tropical climate.

The Darjeeling and Sikkim Himalayas lie in that part of Asia where Nepal, China, India, Tibet and Bhutan are very close together. Though these areas have distinctive peoples, climates, plants and animals but types appear in common and tend to intermingle occasionally where the boundaries of different great areas merge together. The region under study is roughly bounded by Nepal on the westflank, China-Tibet on the North and major part of the East. A part of the East is bounded by Bhutan and West bengal is on the South.

From time immemorial the region was very much influenced by the Lepcha's wonderful knowledge of the medicinal plants in the region (Biswas and Chopra 1940). The land form was inhabited by the Lepchas for a greater part of the history and Lepcha system of herbal medicine was predominated for a long time.

The accession of Raja Phuntsong Namgyal in 1641 A D was a landmark event in the Sikimese history and a starting point of the reign of Bhutia King in Sikkim and the advent of Buddhism. Due to revages of war which was almost regular activity during the 17th century, Sikkim witnessed a repeated transformation over its boundaries. In 1706 what is now the Kalimpong subdivision of present Darjeeling district was taken from the Raja of Sikkim by the King of Bhutan. Until 1865 the area of Kalimpong which was the territory of Bhutan was annexed to India by the British India. During the period the Lepcha system of practice in medicinal plants was mixed up with the culture of Bhutanese, The Raja of Sikkim later became engaged in unsuccessful struggle with the Gurkhas who had invaded Sikkim in 1780. During the next 30 years they over ran Sikkim as far East as the Teesta. In the mean time war broke out between the East India

Company and the Nepalese at the end of which in 1817 by the treaty of "Titaliya" the part which the Nepalese wrested from the Raja of Sikkim was ceded to the Company (Economic Development Profile, 1978). It became obvious therefore that Nepali system of herbal medicine was introduced in the region. At that time the East India Company restored whole of the country between the Mechi and Tista to the Raja and guaranteed his sovereignty. Sikkim was them maintained as a buffer state between Nepal and Bhutan. Lord Willium Bentink the then Governor General expressed his desire to possess the hill of Darjeeling on account of cool climate for the purpose of enabling the servant of his government suffering from sickness. The then Raja of Sikkim out of friendship for the said governot general presented Darjeeling in 1833 to the East India Company that is all the land South to the Great Rangit river, west of Rongo and Mahanadi river. At that time Darjeeling was inaccessible tract of forest. An excellent sanatarium was established for troops and others. European houses were built up with rapid development of township and European systems of medicine was introduced in Darjeeling. In the meantime relation between the Raja of Sikkim and East India Company deteriorated. In 1850 annexation was brought about so that the British territory in Darjeeling became continuous with British India. As a result European system of treatment of disease was reaching gradually even upto the interior of the hills of Darjeeling and Kalimpong of British India and remaining part of Sikkim was very much dependent on primitive system of treatment of diseases practised in the past by the medicine men, herbalists of different hill tribes in the region.

After the independence and the birth of Indian republic, the hills of Darjeeling was converted into Darjeeling district of the State of West Bengal and Sikkim was merged with the Indian Union as the 22nd state in the year 1975.

In Sikkim majority of the population (70%) at present are from Nepali stock. The Bhutia and Lepchas constitute about 30% of the population. The original inhabitant in Darjeeling district was the Lepchas which were rapidly outnumbered by settlers from Nepal and Sikkim. Once the majority of the non-Indian nationals of Darjeeling was Tibetans (Economic Development Profile 1978).

From survey it appears that at present there are four different systems of traditional medicines available in the region - such as Lepchas, Nepalese, Tibetan and Bhutia system. Though Rai and Sharma (1996) mentioned the availability of three systems of medicine but they did not mention the Bhutia system, though this system is being cultured at different places in the region.

Deeply seated in its antiquity but very thinly doccumented the Nepali system of herbal medicine survives to day in the region as "Jaributy" or just semply as "Pahaday Dabai". The practise of herbal medicine has in its true nature not yet attained a system status in itself as in the case with Tibetan system. As because it is not yet organised set up. The "Jaributi" system has to bring up the several disjoined systems together to get proper status (Rai and Sharma 1996). From the survey it appears that Tibetan medicinal prescription usually comes in the form of powder and different forms of extract much in contrast to Nepali medicine where the prescription normally is unprocessed plant product and comes in all of its natural shape, size, colour and form such as bark, twigs, fruits leaves, seeds etc. representing traditional medicine. Though the Tibetan system had its root in ancient Tibet where spirituality dominated in practise but the general practitioner of Tibetan medicine at present relies more on the plant than spirituality.

Out of eight different species six species of *Dioscorea* such as yams and bulbils of *D. alata, D. kamoonensis, D. sikkimensis, D. bulbifera, D. esculenta* and *D. sativum* are edible (table 27) but *D. arachidna* and *D. prazeri* are nonedible types. It has also been observed that though *D. sativum* is considered edible but local people are not habituated with the regular use of the plant though the Lepchas and Bhutias use it regularly. Besides the mature yam of *D. kamoonensis* used by the tribal people is also given to pigs as feed after boiling in water. In connection with the use of *D.esculenta* it has been observed that though local people eat yams but only the Lepchas generally cultivate the species because the local people strongly believe that if the higher castes other than Lepchas cultivate it, generation of the cultivator may degenerate. It is also observed that Nepali people do not eat all the edible *Dioscoreas* regularly but they eat specially the yam of *D. alata, D.sikkimensis, D. bulbifera* and *D. esculenta* to celebrate the festival of "Makar Sankranti" in the month of January in each year. (Fig. 28).

Table 27. :Ethnobotanical use of *Dioscorea sp.* as food and vegetable in Darjeeling and Sikkim Himalayas

Plant species	Local name	Locality	Plant part	User/tribe	Preparation of edible part
D. alata L.	Khamalu	All localities	Rhizome Bulbil	Local people including tribals	Rhizone/bulbil cleaned thoroughly boiled in water cooked or eaten as vegetable.
			Rhizome	Poor people including tribals	Rhizome cleaned thoroughly boiled in water to make it a paste and use as alternative to rice.

Table 28 : Ethnoreligions use of *Dioscorea* sp. by Nepalese in Darjeeling and Sikkim HImalayas

Plant species	Local name	Locality	Plant part	User	Mode of use
D. alata L.	Khamalu	All localities	Rhizome	Nepalese	All Nepali peiopl rhizome boiled to celebrate the festival of "Makear Sankranti" in the month of January each year
D. sikkimensis Prain & Burkil	Niltarul	Do	Do	Do	Do
D. bulbifera L.	Bantarul	Do	Do	Do	Do
D. esculenta	Sutuni	Do	Do	Do	Do

Tubers of certain species of *Dioscorea* are used as staple food in a number of countries of West Africa, South America and the Indian sub-continent. Species like *D. alata, D. esculenta, D. batatas* and *D. bulbifera* fall under this category.

The edible species particularly *D. alata* and *D. esculenta* are characterised by very high tuber yield. The chemical composition in the tuber of the edible types, particularly their nutritional values has been studied earlier (Coursey, 1967; Martin and Thompson, 1971). The starch content in the tuber has been observed to range from 0.42 to 0.78 percent in the three saponin bearing species i.e. *D. composita, D. floribunda* and *D. deltoidea.* However in the edible species, the starch constituted the major proportion of the tuber. It was observed to become 10.59 percent in *D. alata* and 11.53 percent in *D. esculenta* on fresh weight basis. Besides it was also observed that *D. alata* had the least amount of total sugar (1.37 percent) and *D. esculenta* also had more sucrose and glucose than other species. *D. alata* had the lowest amount of sucrose. No distinct pattern of distribution of sugar was discernible to contrast the two groups of species. Crude protein int he tuber was lower in Saponin bearing species (0.96 to 0.426 percent) than in the edible species (2.178 to 2.693 percent). The soluble amino acid pattern was similar in all species but the quantity of individual aminoacid in the tuber varied considerably between different species.

In general saponin bearing *Dioscorea sp.* contained less nitrogen in the tuber than that of edible species, however they had more phosphorous and potassium. There was little difference in iron content in the tuber of different species. According to Bammi and Randhawa (1976) total yields of sterol in the tuber of *D. alata* and *D. esculenta* are 3.37 mg/100g and 0.92 mg/100g respectively as compared to high sterol content of 9.72 mg/100g and 4.68 mg/ 100g in commercially important non edible diosgenin yielding plant like *D. composita* and *D. floribunda* respectively.

Worshipping for blessings and betterment of life is a practise common to all human beings. During worshipping traditional rituals are being performed. SInce time immemorial these customs are being observed in tribal communities in Darjeeling and Sikkim Himalayas. But there is no doubt that from ancient days only those plants are having with economic benefits they are being treated as sacred plants.

One of the primitive traits in the culture of the people of Darjeeling and Sikkim Himalayas is the existence of spiritualists known as "Jhankri" was also practice herbalism. In connection with ethnospiritual use of *Dioscorea* (Table 29) it has been observed that rhizome of *D. arachidna* is used by

Phedangmas (Limbus' Doctor) and Bizuwas (Rais' Doctor) to kill evil spirit. Common people believe that persons affected with ghost or evil spirit are having with less energy

Table 29. : Ethnospiritual use of different species of *Dioscorea* in Darjeeling - Sikkim Himalayas

Plant Species	Local Name	Locality	Plant part	User/tribe	Purpose/ mode of use
D. arachidna Prain & Burkill	Bharlang	Tanek, Chibo, Suruk, Bung-busty, Sinder-bung, Samthar	Rhizome	Limbus, Rais	Fresh rhizome after being cleared are eaten by the tribal people as per recomendation of Phedangmas (Limbus' doctor and Bizuwas (Rais' doctor) commonly known as "Jhankri" the Spiritualists in the region.

and vigour. It is expected that the yam of *D. arachidna* may contain some natural product having stimulatory property and which may be called mind altering substance.

From literature it appears that during fifteenth century the Europeans were habituated using a few mind altering substances. At that time the population had no coffee, tea, opium, cocaine, tobacco etc. It has been reported by Lewis and Elvin-Lewis (1977) that substitute like roasted parts of yam of *Dioscorea* was used as stimulating beverage. They also mentioned that tea made from the roots of *D. villosa* was taken by Meskwakis to relieve body pain in fatigue condition. One can recall the ritualistic use of "Soma" or "Somrash" of the Hindu epics. About 20 different plants have been attributed to this name (Jain 1981). According to Shah and Badola (1977) climber like *D. bulbifera* has got certain similarity with that of "Soma", representing ancient literature.

As regards the ethnomedicinal use (Table 30) of different species of *Dioscorea* the Lepchas in the region of Darjeeling and Sikkim Himalayas generally use the yam of *D. prazeri* for hair washing to kill lice and fish poisoning, but others like Limbus, Rais, Ramang, Chettris and Mongers use the water docoction of the yam of the species for curing wound of human being. They also use the powder of the yam to check population by induction of abortion. It has

been observed that Nepali people use the yam of *D. bulbifera* for remedy against piles, bronchities, tumors, asthma, dysentry. Besides they also use it as anthelmintic and to relieve pain in the abdomen. Lee *et al.* (1999) observed anti-diabetic activity of *D.batatas* in mice. Min et al. (1998) carried out ethnopharmacological investigation, taking rabbit model to show that the root tuber of *D. opposita* had regulative effect on the thyroid disfunction of thyroidectomized animals.

Table - 30 : Ethnomedicinal use of different species of *Dioscorea* in Darjeeling and Sikkim Himalays.

Plant Species	Local Name	Locality	Plant part	User/tribe	Preparation/ Dosage	Purpose
D. sativum L.	Githa	Gorubathan, Mansong, Tanak, Bung-busty, Bijan-bari, Surat, Santhar.	Rhizome	All tribal people	Rhizome boiled in	To kill worms present in stomach to check gastric trouble
D. prajeri Prain & Burkill	Cucur-tarul	Nangsondang, Tanak, Chhibo, Khani, Suruk, Gitedebling	Rhizome	All tribal people	Crushed rhizome boiled in water	Water solution of rhizome used allover the surrounding of wound for cheking swelling and infection.
			Rhizome	Lepchas	Crushed boiled in water.	Hair washing for killing lice also used as fish poison.
		Tunuk, Jorthang, Ratomale	Rhizome	Limbus, Rais, Tamang, Chettris, Mongers	Powder of dried rhizome	For abortion
D. bulbifera L	Bantarul	All localities	Rhizome	Nepali people	Powder of dried rhizome	Piles, Asthma Dysentry, Bronchitic, Tumors, Abdominal pain.

Seventy seven species representing 71 genera and 42 families of flowering plants used as crude drugs in veternary practices by folklore in Warangal district

of Andhra Pradesh, India have been enumerated (Reddy et al. 1998). Out of these plants, *D. bulbifera* and *D. pentaphylla* are commonly used by the local people. Though they mentioned common veternary diseases of the district such as anthrax, cough, dysentry, inflammatory, diseases, lack of milk secretion etc. but no information with special emphasis on scientific evaluation of the species of *Dioscorea* as veternary medicine is available.

Ethnoveternary use of different species of *Dioscorea* (Table - 31) has been observed in the region of Darjeeling and Sikkim Himalayas. The yam of *D. kamoonensis* is commonly used as a remedy against "Bhyagute" disease of cattle by all the tribal people specially the Lepchas, Bhutias and Sherpus in the region. This type of disease has a symptoms of respiratory trouble of cattle producing irritating sound. Certain type of slimy fluid generally comes out as tears from eyes. Milk producing cattle generally stop to give milk. Body temperature rises to 104° - 106°F. the surrounding areas of head, neck, chest, excretary and reproductive organs swell up. Blood comes out with the stool. Generally animal dies within 12-24 hours after the initiation of the symptoms. For remedy against the disease yams of *D. kamoonensis* are cut into pieces and are forced to enter into the mouth of the cattle as feed. This is generally repeated thrice daily for one week. The scientific name of the Bhyagute disease is known as "Haemorrhagia Septimae". The name of the causal organism of the disease is *Pasteurella bovisentica*. In modern therapy Sulphamezithin (5 gm.) and vaccination is used. The rhizome of *D. sativum* has been ovserved to become effective against parasitic disease caused by *Fasciola hepatica* in cattle and for which the animal becomes weak and their eyes look yellow with swelling of stomach. Yams of *D. sativum* are generally given to the diseased cattle to eat the yam after boiling with water that most of the diseases which are caused by different microbes and parasites are cured by the use of yams of different *Dioscorea* and it is expected that all these species must have some natural product having anti microbial and antiparasitic activity and which are yet to be workedout.

The modern antibiotic era can be said to have opened on February 12, 1941 with the first clinical trial of Penicillin. This was followed by the introduction of one after another of major antibiotic substances which remain the mainstay of clinical therapy of infectious disease to this date. Intensive screening has

resulted in literature the description of more than 2000 individual antibiotic (Mitscher 1975).

Table - 31 : Ethnoveternary use of different species of *Dioscorea* in Darjeeling and Sikkim Himalays.

Plant Species	Local Name	Locality	Plant part	User/tribe	Name of the disease & symptoms	Dosage/ Preparation
D.kamoonensis Kunth		Tanek, Singi, Samaltsung, Khari, Samathar, Lolay, Gitdebling, Suruk.	Rhizome	Lepchas, Sherpas, Kam,Dorjee Sarki,Sunar, Manger, Gurung, Ghate, Chettri, Bahun, Thakuri.	"Bhyagute" disease of cattle, the scientific name of which is *Haemorrhagia septimae"* caused by *"Pasteurella boviseptica".* Difficulty in respiration producing some irritating sound, certain type of slippery fluid comes out from the eys, milk producing cattle stop to give milk, body temp. rise to 104°F-106°F, swelling of head, neck, chest, excretory & reproductive organs, stool with blood, usually the animal die within 12 hrs. after infection.	Rhizomes of the plant should be cut into pieces & should supplied into the mouth of the diseased cattle. This should be contained thrice daily for one week Modern therapy Silphamezithin (5gm/day) or vaccination.
D. sativum L	Githa	Tanek, Singi, Khari, Lolay, Gitdebling, Suruk.	Rhizome	Lepchas, Bhutias, Sherpas, Manager, Bahun, Sarki.	Parasitic disease of cattle caused by *"Fasiola hepatica"* Cattle becomes weak and eyes look yellow in colour, swelling of stomach.	Rhizome of the plant should be boiled in water & after boiling the rhizome should be given to the infected cattle to eat.

Man has doubtless been aware at least dimly for centuries that antimicrobial agents are present in higher plants because the folk literature contains frequent references to such uses stretching back for at least 6000 years. Large scale screening programme for antimicrobial agents from higher plants were undertaken in the 1940's using methodology which enables one to judge the relative worth of results. An examination of *Dioscorea bulbifera* from Western Samoa in the Pascific area by Norton et al. (1973) it was found that the plant to be of greatest interest specially in connection with its antimicrobial activity.

While searching for biologically active plant ingradiants by means of antimicrobial tests on oriental crude drug preparations Imai et al. (1967) observed that *D. tokoro* gave Dioscin, Gracillim and Dioscinprosapogenin as active agents. This is followed up by the study of the activity of 23 steroidal sapogenin and saponins which indicated that only saponins are active. According to them well known haemolytic activity of saponins probably prevent these agents from playing a role in systemic infections of humans. Recently a phenanthrene derivative has been isolated from the tuber peels of *D. delicata,* a natural medicine in Japan, to show its antifungal activity against *Cladosporium cladosporoides* (Haraguchi 1999).

Dioscin is a glycoside of diosgenin (Fig. 44) and is commonly present in the yam od *Dioscorea,* structurally it has chacotriose i.e. rhamnose - glucose rhamnose type of carbohydrate moiety linked with diosgenin. Though haemolytic property of Dioscin has not been worked out in details but the lytic property of solamargine which is also chacotriose of solasodine - a nitrogen analogue of diosgenin (Fig. 44), has been worked out in details. Solamargine causes significant disruption of phosphatidyl, cholesterol liposomes (Roddick et al. 1990). Its deleterious effect on variety of structures renging from synthetic membrance (Roddick and Drysdate 1984) through organelles and cells (Roddick 1978) to living organism (Tingey 1984) including man have been worked out. Solamargine has been observed to show lytic effect on *Penicillium notatum* derived protoplast and bovine erythricytes (Roddicket al 1990). Erythrocytes are much more susceptible to lysis. Solamargine caused 100% haemolysis at 20μM. The significance of this phenomenon is generally related to chacortiose nature of carbohydrate.

Recently Puri et al (1999) confirmed the similar structural property of solasodine and diosgenin with the help of H^1 and ^{13}C assignment by two dimensional NMR spectroscopy. According to them chemical shift of protons for both the chemicals are very close.

It is obvious therefore that haemolytic property of Dioscin may be attributed to the presence of rhamnose-glucose-rhamnose combination in the carbohydrate and which is available in different *Dioscorea* showing ethnomedicinal value. However, the biochemical basis of the effect is not yet understood.

Thus the traditional use of elimination of water soluble part of the yam of edible species and utilisation of yam with water soluble part for the cure of wound infection and other type of infection may be claimed to be due to toxic constituent like dioscin in the yam of *Dioscorea* and which has been justified by the lytic effect in connection with antimicrobial activity of dioscin and that has been represented in the chapter V.

Beneytout et al (1995) claimed diosgenin present in *Dioscorea* as a new megakaryocytic differentiation of HEL (Human Erythroleukemia) cells and observed that diosgenin addition to HEL TIB 180 cell line induces morphological and biochemical changes characteristic for megakaryocytic cells assessed by cellular morphology, endomitotic process and glycoprotein content. Erythro leukemia is a disorder that combines involvement of red cell precursor and myeloid precursor to show malignant alteration of several cell lines in the blood.

The extraction, quantification and identification of the cynoglucosides in economically important yam varieties was carried out by Mulleng et al (1999) in different varieties of four *Dioscorea* species namely *D. alata*, *D, cayenensis*, *D. esculenta* and *D. ratundata.* Taking the help of HPLC then confirmed linamarin as the main cyanoglycoside in yams. This result could be of reference in appropriate selectivity in the promotion of desirable cultivars of yam for the food and health industries, since cyanide from linamarin, apart from interfering with oxidative processes of metabolism, also produces pancreatic damage by free radical mechanism reaction and is therefore thought to be a factor in malnutrition related diabetes. Thus the cultivars with low levels of cyanoglucoside should be favoured for consumption and cultivation.

SUMMARY

During the survey on ethnobotanical practice available in the region of Darjeeling and Sikkim Himalayas, it has been observed that four different systems of traditional medicines such as Lepcha, Nepalese, Tibetan and Bhutia. Systems of medicine are still being cultured at different places in the region.

Out of eight species of *Diascorea* yam of six species such as *D. alata, D. kamoonensis, D. sikkimensis, D. bulbifera, D. esculenta* and *D. sativum* are edible but *D. arachidna* and *D. prazeri* are non edible.

Ethnoreligious use of yam of *D. alata, D. sikkimensis, D. bulbifera* and *D. esculenta* has been observed by the Nepali people on the day of "Makar Sankranti".

Ethno spiritual use of yam of *D. arachidna* by Limbus and Rais people has been observed.

In connection with ethno-veternary use, *D. kamoonensis* acts as a remedy against "Bhyagnte" disease (Haemorrhagia septimae)of cattle caused by *Pasteurella bovistca.* The yam of *D. satvum* is being used as a remedy against parasitic disease of cattle caused by *Fasiola hepatica.*

The traditional use that the edible yam of *Diascorea* should be boiled with water and is to be discarded is well justified by the investigation that the boiled water contains toxic factor like dioscin, a saponin having a lytic property to damage red blood cell, or fungal cell due to its Chacotrise sugar moiety containing Rhammnose, Rhammnose and glucose to diasgenin.

However it is expected that the yam of *Dioscorea* containing water soluble part of dioscin becomes effective against microbial infection when it is used external to human or animal body.