APPENDIX - I

AUTHORS PUBLICATION

1. PAPER

Investigation on Ethnic use of *Dioscorea* spp. available in Darjeeling and Sikkim Himalayas and Scientific evaluation of their traditional practice P. K. Basu and B. Gautam (2001).

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2. ABSTRACT

Applicaiton of a newly established colorimetric method for quantitative estimation of diosgenin in some wild species of *Dioscorea* available in Kalimpong, West Bengal. P. K. Basu and B. Goutam

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Plant Biodiversity - Systematics, Conservation and Ethnobotany (in press)

INVESTIGATION ON ETHNIC USE OF *Dioscorea spp.* AVAILABLE IN DARJEELING AND SIKKIM HIMALAYAS AND SCIENTIFIC EVALUATION OF THEIR TRADITIONAL PRACTICE.

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Abstract

During survey on ethnobotanical practice in Darjeeling and Sikkim Himalayas, eight species of *Dioscorea* have been identified. The traditional use of all the species has been observed to involve the elimination of water soluble part of boiled yam used for edible purpose but utilisation of the same for the cure of wound infection in the skin of human body. Dioscin, a rhmnoglucoside of diosgenin has been isolated and identified as a toxic constituent in the water soluble part of the yam of *Dioscorea* the toxicity of the natural product is being claimed to be due to its lytic property as observed during anti-fungal activity against *Aspergillus niger*

INTRODUCTION

The knowledge of herbal medicine that has come through generations 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 portion of population still depend on natural resources in particularly indigenous condition and the impact of modern system of medicine has not reached them.

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 has rendered them to become indispensable part of culture of the people of the region, a sizeable population being comprised of the tribals.

Sir J.D. Hooker (1854) made the exhaustive floristic work on the Darjeeling and Sikkim Himalayas 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 (Biwas and Chopra 1940). Later observation on ethnobotanical studies in the region have been published (Bennet 1983; Tamang and Yonzone 1982; Yonzone *et al* 1984).But all the authors so far attempted in this line of work did mot mention *Dioscorea* as traditional or tribal medicines in the region. Though Nakamura (1998) did not mention the scientific name of "Turo" a traditional vegetable under Dioscoreaceae in Kyoto but according to him the plant had the ability to show bio-antimutagenicity.

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.

This paper deals with discussion on present day use of different species of *Dioscorea* by the local as well as tribal people in the region.

MATERIALS AND METHODS

MATERIAL:

Eight different species of *Dioscorea* have been taken into consideration. These are: *D. alata* L., *D.kumaonensis* Kunth., *D.arachidna* Prain & Burkill, *D.sikkimensis* Prain & Burkill, *D.bulbifera* L., *D.esculenta* Burkill, *D.prazeri* Prain & Burkill and *D. sativum* L.

METHOD: FIELD WORK FOR COLLECTING OF PLANT MATERIALS AND INFORMATION.

Intensive field work has been done among different types of tribal populations i.e. Lepchas, Sherpas, Bhutias, Kami, Dorjee, Sarki, Sunar, Manger, Gurung, Ghate, Chettri, Bahun, Thakuri, Limbus and Rais available at fifteen different villages in Darjeeling district such as Tanek, Somalbung, Singi, Gorubathan, Mansong, Khari, Samthar, Nangsonden, Lolley, Gitdebling, Chhibo, Suruke, Sindebling, Bungbusty, Bijanbari, and seven villages in Sikkim i.e. Kerbari, Dentam, Ratomte, Singtam, Jorthang, Namchi, Rambhabung have been visited. Information on ethnomedicinal in the region has been collected from knowledgeable persons, medicine men and practitioner.

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

IDENTIFICATION OF PLANTS:

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

EXTRACTION, PURIFICATION AND IDENTIFICATION OF SAPONIN

Yam of *D. alata* was taken out from the soil and washed with water to free it from soil debris. The freshly cut yam was crushed in an electrically operator mixer to form a paste. The pasted yam was mixed with water and boiled at 100 °C for 1hr. under reflux condition. The water extract after filtration was evaporated to dryness. The solid mass was extracted with methanol and crystals were obtained from chloroform methanol following Harborne (1973). Various solvent mixtures such as Butanol:acetic acid : water (4:1:5), Methanol: Chloroform (9:1) and Phenol saturated with water were used for identification of steroidal constituents and sugars during paper chromatography.

PREPARATION OF POTATO DEXTROSE AGAR

Pure culture of P.D.A. was produced following Johnston and Berth (1983).

INOCCULATION OF CULTURE MEDIA WITH *Aspergillus niger*.

Two types of slants were used. In one type, *A. niger* was inoculated to freshly prepared P.D.A. in the test tube. In another tube the culture medium was previously mixed with 100ppm of the isolated dioscin in water and the slant was inoculated with the same fungus. The observation was noted after seven days, keeping both the types of slants at 25°C.

RESULTS AND DISCUSSION

It is established that majority of *Dioscorea* spp. are distributed in tropical and subtropical region all over the world including India. During survey eight different species of *Dioscorea* 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 Himalaya is occupied by the people belonging to different ethnic groups. It is apart from the three major ethnics –Bhutia, Lepcha and Nepalese, a conglomerate of over 20 ethnic tribes and a still more number of subtribes (Rai and Sharma 1996).

The climate in Northern part of Darjeeling and Sikkim Himalayas is dry and cold and most of the land is having higher altitude, which is beyond the range of monsoon resemble 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 *Dioscorea* spp. 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 West flank, 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 Lepchas 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 predominant for a long time.

In Sikkim majority of the population 70% at present are from Nepali stock. The Bhutias 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) mentionsd 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 documented the Nepali system of herbal survives today in the region as "Jaributy" or simply as "Pahaday Dabai". The practise of berbal medicne 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 "Jaributy" system has to bring up the several disjoined systems together to get proper status (Rai & Sharma 1996). From the survey it appears that Tibetan medical prescription usually comes in the forms 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, twig, 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 plants than spirituality.

TABLE-1: ETHNOBOTANICAL USE OF ***Dioscorea Sp.*** AS FOOD AND VEGETABLE IN DARJEELING AND SIKKIM HIMALAYAS

Plant species	Local name	Locality	Plant part	User	Preparation of edible part
D. alata L.	Khamalu	All locality	Rhizome & Bulbill. Rhizome	Local people including poor tribals. Poor people including tribals.	Rhizome / bulbill cleaned thoroughly boiled in water cooked or eaten as vegetable. Rhizome cleaned thoroughly boiled in water to make it a paste and used as alternative to rice.
D.sikkimensis Prain & Burkill	Niltarul	All locality	Rhizome & Bullbill	Local people including tribals.	Rhizome / bulbill cleaned thoroughly boiled in water and eat as vegetable.
D. bulbifera L.	Bantarul	All locolity	Rhizome & Bulbill	Tribals	Rhizome / Bulbill cleaned thoroughly boiled in water and eat as vegetable.
D.kumaonensis Kunth.		Turuk,Dentam, Samalbung, Samthar, Lolay, Gitdebling, Suruk,Namchi, Kerabari,Dentam, Singi, Singtam,Kham, Jorthang,	Young rhizome Rhizome & bulbill Old (mature) rhizome	Local people Poor local people Tribals	Young rhizome which lack fibres are used as vegetable. People eat both rhizome and bulbills after being boiled in water. Old rhizome, boiled in water are given to pigs as food.
D.esculenta Burkill.	Sutuni	Do-	Rhizome	All local people and tribals especially Lepchas.	Eat rhizomes after being boiled in water.
D. sativum L.	Githa	Lolay, Turuk, Gitdabling, Rambhabung, Jorthang.	Rhizome & Bulbill	All tribals especially Lepchas and Bhutias.	Though edible after boiling in water but local people do not eat regularly.

Table – 2: ETHNORELIGIOUS 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	Nepali	All Nepali people eat a part of rhizome boiled to celebrate the festival of "Makar Sankranti" in the month of January each year.
D. sikkimensis Prain & Burkill	Niltarul	Do	Do	Do	Do
D. bulbifera L.	Bantarul	Do	Do	Do	Do
D. esculenta	Sutuni	Do	Do	Do	Do

Table – 3: ETHNOSPIRITUAL USE OF DIFFERENT SPECIES OF ***Dioscorea*** IN DARJEELING AND SIKKIM HIMALAYAS

Plant species	Local name	Locality	Plant part	User/Tribe	Purpose/mode of use
D. arachidna Prain & Burkill	Bharlang	Tanek, Chibo, Suruk, Samthar, Bungbusty,	Rhizome	Rais & Limbus	Fresh rhizome after being cleaned are eaten by the tribal people as per recommendation of Phedangmas (Limbu's doctor) and Bizuas (Rai's Doctor) commonly known as "Jhankri" the spiritualist in the region.

Table – 4: ETHNOMEDICINAL USE OF DIFFERENT SPECIES OF ***Dioscorea*** IN DARJEELING-SIKKIM HIMALAYAS

Plant species	Local name	Locality	Plant part	User/Tribe	Preparation	Purpose
D. sativum L.	Githa	Gorubathan, Mangsong, Tanak Bungbusty, Bijanbari, Surut, Samthar	Rhiome	All Tribal people	Rhiome boiled in water.	To kill worms present in stomach, to check gastric trouble
D. prajeri Prain & Burkill	Cucurtarul	Nangsondang,Tanak, Chibo, Khoni, Suruk, Gitdebling	Rhizome Rhizome	All tribal people Lepchas	Crushed rhizome boiled in water. Crushed rhizome boiled in water	Water solution of rhizome used all over the surrounding of wound for checking swelling and infection. Hair washing for killing lice, also used as fish poison.
		Turuk, Jorthang, Ratomale	Rhizome	Limbus, Rais, Tamangs, Chettris & Mangers.	Powder of dried rhizome	For abortion
D. bulbifera L.	Bantarul	All Localities.	Rhizome	Nepali people	Powder of dried rhizome	Piles, tumors, Asthma Bronchitis, Anthelmintic, abdominal pain.

Table –5: ETHNOVETENARY USE OF DIFFERENT SPECIES OF *Dioscorea* IN DARJEELING-SIKKIM HIMALAYAS.

Plant species	Local name	Locality	Plant part	User / tribe	Name of the disease and symptoms	Dosage/ preparation
D.kumaonensis Kunth		Sanaktsung, Singi,Lolay,Tanek, Khari,Suruk Samthar, Gitdebling	Rhizome	Lepchas, Sherpas, Bhutias, Kam, Chettri Dorjee, Sarki, Sunar Manger, Gurung, Bahun Ghate Thakuri	"Bhyagute' disease of cattle, the scientific name of which is Haemorrhagia septimae caused by "Pasteurella boviseptica" difficult in respiration producing some irritating sound, certain type of slippery fluid comes out from the noses, tears always comes out from the eyes, milk producing cattle stops to give milk, body temp. rise to 104°F-106°F, swelling of head, neck chest, excretory and reproductive organs, stool with blood, usually the animal die within 12 hours after infection.	Rhizome of the plant should be cut into pieces and be supplied into the mouth of the diseased cattle. This should be continued thrice daily for one week. Modern therapy sulphamezi-thin (5gm/day) or vaccination.
D.sativum L.	Githa	Tanek, Singi khari, Lolay, Gitdebling, Suruk	Rhizome	Lepchas, Bhutias, Sherpas, Mangers, Bahun, Sarkis.	Parasitic disease of cattle caused by *Fasciola hepatica.* Cattle becomes weak and eyes look yellow in colour, swelling of stomach.	Rhizome should be given to the infected cattle to eat.

Table-1 shows that six species of *Dioscorea* such as yams and bulbils *D. alata, D.kumanensis, D.sikkimensis, D. bulbifera, D.esculenta, D. sativum* ,are edible 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. kumaonensis* 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 *Dioscorea* regularly but they eat specially the yam of *D.sikkimensis, D. bulbifera, D.esculenta, D. alata* to celebrate the festival of "Makar Sankranti" in the month of January in each year. **(Table-2)**

Tubers of certain species of Dioscorea are used as staple foods in a number of countries of West Africa, South America and the Indian subcontinent.

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). The starch constituted the major portion of the tuber. It was observed to become 10.59 % in *D. alata and 11.53% in D. esculenta.* Besides it has also been observed that *D. alata had 1.37%* of total sugar as compared to 4.08 % in *D. esculenta* . Besides, *D. esculenta* had more sucrose and glucose than those

of *D. alata*. According to Bammi and Randhawa (1975) total yields of sterol in the tuber of *D. alata* and *D.esculenta* are 3.37mg/100gmand 0.92mg/100gm respectively.

Worshipping for blessing and betterment of life is a practice common to all human beings. During worshipping traditional rituals are being performed. Since the time immemorial this 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" who also practice herbalism. In connection with ethnospiritual use of Dioscorea it has been observed that rhizome of *D. arachidna* is used by *Phedangmas* (Limbus' Doctor) and *Bizuas*(ais'Doctor) to kill evil spirit (**Table-3**). Common people believe that persons effected with ghost or evil spirit are having with less energy 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 A.D Europeans were habituated using a few mind altering substances. At that time the population had no coffee, tea, opium, cocane, tobacco etc. It has been reported by Lewis and Elvin-Lewis (1977), that substitute like roasted part 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 of fatigue condition.

As regards the ethnobotanical use of different species of Dioscorea, the Lepchas, generally use the yam of *D.prazeri* for hair washing, to kill lice and fish poisoning,.But others like Limbus, Rais, Tamang, Chettris and Mongers use the water decoction 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, Bronchitis, Tumors, Asthma, and Dysentry. Besides, they also use it as anthelmintic and to relieve pain in the abdomen. (**Table-4**).

Min et al (1998) carried out ethnopharmacological investigation in Australia taking rabbit model to show that the root tuber of *D.opposita* had regulative effect on the thyroid disfunction of thytroidectomized animals.

Ethnovetenary use of different species of Dioscorea has been observed in the region (**Table– 5**). The yam *of D. kumaonensis* is commonly used as a remedy against "Bhyagute" disease of cattle by all tribal people specially the Lepchas, Bhutias and Sherpas in the region. This type of disease has a symptom of respiratory trouble of cattle producing irritation sound. Certain type of slimy fluid generally comes out as tears from eyes. Milk producing cattle generally stops to give milk. Body temperature rises to 104° –106° F. The surrounding areas of feet, neck, chest, excretory and reproductive organs swells up. Blood comes out with the stool. Generally animals dies within 12-14 hrs. after the initiation of the symptoms. For remedy against the disease yams of *D.kumaonensis* 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 boviseptica*. In modern therapy Sulphamezitin (5gm) and vaccination is used. The rhizome of *D. satuvum* has been observed 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.

Thus we find 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 active against causal organism.

While working on isolation of steroidal constituents in the yam of different species of *Dioscorea*, it was observed that even in rainy season the water extract of the yam of *D. alata* did not show any contamination of micro- organism. Though the material extracted with other solvents kept in a container showed severe contamination with a fungal strain. The fungus was identified as *Aspergillus niger*.

In order to understand the nature of chemical inhibitor in the Yam of *D. alata* to serve as antifungal agent, chemical investigation was carried out following the conventional phytochemical method.

The crystals that were obtained after extraction of the yam of *D.alata* with water and subsequent methanol-chloroform treatment was observed to show melting point at 287°C. That the isolated product was a saponin,was confirmed by heavy frothing or soapy lather while boiling the natural product in water. The Rf values of true saponin i.e. 0.25and 0.45 in Butanol: acetic acid: water (4:1:5v/v/v upper phase) and Methanol: Chloroform (9:1 v/v) respectively have been observed to be the same as those of authentic dioscin. The IR spectrum of the saponin showed characteristic peaks (lambda) $_{max}$ 3350 (Broad) 1640, 1375, 1175, 1050, 850, 820, 720 cm^{-1} and were superimposed with those of authentic dioscin. The sapogenin was derived after following the procedure adopted by Harborne (1973). The sapogenin obtained after acid hydrolysis showed melting point 206-208 °C. The chromatographic behaviour and the observation on IR spectrum of the isolated sapogenin were observed to be the same as those of authentic diosgenin. After removal of diosgenin from the acid hydrolysed part of saponin, the filtrate was neutralised with Barium carbonate, concentrated and spotted on paper for chromatography. The Rfs of Rhamnose, 0.34 and 0.59 and those of glucose 0.13and 0.34 were observed to be the same as those of isolated products in the solvents of Butanol:Acetic acid : Water (4:1:5 v/v/v) and Phenol saturated with water respectively.

Fig.1A.shows that the slant without dioscin served medium for good growth of *A. niger* as reflected from the very good formation of white mat of mycellium. Whereas Fig.1B shows the dead mycellium of hyphae due to lysis of membrane. It is very interesting to note that the centrally placed dioscin free agar bearing inocculum shows white mat of hyphae: still in living condition.

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 descriptions of more than 2000 individual antibiotic (Mitscher 1975).

Man has doubtless been aware at least dimly for centuries that anti-microbial agents are present in higher plants because the folk literature contains frequent references to such use, Stretching back for at least 6000 years. Large scale screening programme for anti-microbial 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 pacific area, Norton *et al* (1973) found that the plant to be of greatest interest especially in connection with its anti microbial activity.

While searching for biologically active plant ingredients by means of antimicrobial tests on oriental crude drug preparations, Imai et *al* (1967) observed that *D. toro* gave Gracillin and Dioscinprosapogenin as active agents. This is followed by the study of the activity of 23 steroidal aspogenin 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.

Dioscin is a glycoside of diosgenin and is commonly present in the yam of *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, has been worked out in details. Solamargine cause significant disruption of phosphatidyl/Cholesterol, liposomes (Roddick *et al* 1990). There is a good evidence that membrane disruption by glycoalkaloids is a consequence of their binding to the free sterol components of membrane (Roddick 1987). Solamargine has been observed to show lytic effect on *Penicillium notatum*, derived from protoplast and bovine erythrocytes (Roddick *et al* 1990). Erythrocytes are much more susceptible to lysis. Solamargine caused 100% haemolysis at 20 micrometer. The significance of this phenomenon is generally related to Chacotriose nature of carbohydrate.

Recently, Puri *et al* (1993) confirmed the similar structural property of Solasodine and Diosgenin with the help of ^{1}H 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 (unpublished) showing ethnocedicinal value. Thus the traditional use of elimination of water-soluble part of 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*.

Recently, Beneytout *et al* (1995) claimed diosgenin as a new megakaryocytic differentiation inducer 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.

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LITERATURE CITED

Bammi,R.K and Randhawa,G.S. 1975. *Dioscorea* improvement project status report. Indian Institute of Horticultural Research (ICAR) India.

Biswas, K. & Chopra, R.N. 1940. Common medicinal plants of Darjeeling and the Sikkim Himalayas. Soni Reprints Agency, New Delhi.

Beneytout, J.L; Nappez, C.; Leboutet, M.J. & Malinvaud, G. 1995. A plant steroid diosgenin, A new megakarycytic differentiation inducer of HCL cells. Biochemical and Biophysical Research communication 207(1):398-404.

Bennet, S.S.R. 1983. Ethnobotanical studies in Sikkim. Indian Forester 109(7): 517-581.

Coursey, D.G. 1967. Yams. Longman. London.

Economic and Development profile, Sikkim. 1978. Planning and Development Department, Govt. of Sikkim

Faulks,P.J. 1958. An Introduction to Ethnobotany, Moredale, London.

Ford, R.E. 1978. The nature and status of Ethnobotany. Anthrop paper No- 67, Museum of Anthropology; University of Mechigan.

Harshberger,J.W. 1985.Some new ideas, Evening Telegraph, Philadelphia.

Harborne, J.B. 1973. Phytochemical methods, Chapman and Hall, London.

Hooker, J.D. 1854. Himalayan Juornals, 2 Vol London.

Imai. S.; Fujiok, S.: Murata, E.; Goto, M.; Kawasaki, T. and Yamannchi, T. 1967. Bioassay of crude drugs and oriental drug preparetion (XXII). Takeda Kenkyssho, Nempo. 26.

Johnston, A. and Booth, C. 1983. Plant pathologists Pocket book, Oxford & IBH Publishing Co., New Delhi.

Jain, S.K. 1981 Glimpse of Indian Ethnobotany Oxford & IBH Publishing Co., New

Jain, S.K. 1968. Ethnobotany. Interdisciplinary Science Review 2(3): 285-292.

Lewis, W.H. and Elvin-Lewis M.P.F. 1977.Mmdical Botany, Plants affecting Man's Health, John Wiley & sons, New York.

Min, X.; Xiaohui, Z.; Zhaixang, D. and Ming, O. 1998. Effect of young toxifying herbs on Myocardial beta adrenoceptors. Of hypothyroid rabbits. Journal of Ethnopharmacology 60(1): 43-51.

Mitscher, L.A. 1975.Antimicrobial agents from higher plants., In V.C.Runeckels (ed.) Recent Advances in Phytochemistry. Vol-9. Plenum Press, New York.

Na Kamura, G.; Sugamura,E.; Kuyama, N.; Sato, K and Ohtruki, K. 1998. Comparative bio- antimutagenicity of common vegetables. And traditional vegetables in Kyato. Bioscience, Biotechnology and biochemistry 62(6): 1161-1165.

Norton, T.R.; BristolM.L.; Read, G.W.; Bushnell, O.A.; Kashiwagi, M.; Okinaga,C.M. and Oda,C.S. 1973. Pharmacological evaluation of medicinal plants from Western Samoa. J. Pharm. Sci. 62: 1077-1080.

Puri, R.; Wong,T.C. and Puri,R.K. 1993. Magnetic Resonance in Chemistry 31: 278-282.

Rai, P.C., Sarkar, A., Bhujel, R.B. and Das, A.P. 1998. Ethnobotanical studies in some fringe areas of Sikkim and Darjeeling Himalayas. J. Hill Res. 11(1): 12 - 21.

Roddick,J.G.; Rumenberg, A.L. and Weissenburg, N, 1990. Membrane disrupting properties of the steroidal glycoalkaloids, Solasonine and Aolamargine. Phytochemistry 29:1513-1518.

Roddick, J.G. 1987. In ACS Symposium Series 325,

Fuller, G.: and Nes,W.D. (ed.) p.268. American Chemical Soc., Washington D.C.

Rai,L. and Sharma, E. 1996. Medicinal plant of the Sikkim Himalaya status, usaga and potential. Bishen Singh and Mahendra Pal Singh, Co., Dehra Dun. India.

Tamang, K.K.and Yonzone G.S. 1982. A brief note on the vegetation from Lebong to Tiger Hill in Darjeeling. J. Beng. Nat. Hist. Soc. 1: 93-95.

Yonzone,G.S.; Yonzone, D.K.N. and Tamang K.K. 1984. Medicinal plants of Darjeeling District. J.Econ. Taxon. Bot. 5:3-5.

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গবেষণাপত্রের সংক্ষিপ্তসার
Abstract of Papers

পশ্চিমবঙ্গ রাজ্য বিজ্ঞান ও প্রযুক্তি সংসদ
বিজ্ঞান ও প্রযুক্তি এবং অপ্রচলিত শক্তির উৎস বিভাগ
পশ্চিমবঙ্গ সরকার,
উত্তরবঙ্গ বিশ্ববিদ্যালয়
এবং
পশ্চিমবঙ্গ বিজ্ঞান মঞ্চ

West Bengal State Council of Science & Technology
Department of Science & Technology and
Non-conventional Energy Sources
Government of West Bengal,
University of North Bengal
and
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পশ্চিমবঙ্গে অবস্থিত কালিমপঙ এলাকার বিভিন্ন বন্য ডাইয়োস্কোরিয়া প্রজাতির মধ্যে ডাইয়সজেনিন পরিমাপে এক নতুন ধরণের কলোরিমিটার পদ্ধতির ব্যবহার

বি. গৌতম এবং পি. কে. বসু
ফারমাকোগ্নসি রিসার্চ ল্যাবরেটরি,
উদ্ভিদ বিজ্ঞান বিভাগ,সেন্টার ফর লাইফ সাইন্সেস
উত্তরবঙ্গ বিশ্ববিদ্যালয়, শিলিগুড়ি - ৭৩৪ ৪৩০

বিভিন্ন ঔষধ প্রস্তুত করণে ডাইয়সজেনিন সাধারনত ১৬-ডাইহাইড্রো প্রেগনেনোলোন এ্যাসিটট তৈরী করতে বিশেষ কাজে লাগে। কারণ এর থেকেই তৈরী হয় জীবনদায়ী ঔষধ কর্টিসোন ও জন্মনিরোধক বড়ি। বর্ত্তমানে ভারতবর্ষে ডাইয়সজেনিন উৎপাদনের যে সমস্ত উৎস রয়েছে, ক্রমাগত লোক সংখ্যা বৃদ্ধির জন্য তা যথোপযুক্ত নয়। তাই বর্ত্তমানে ডাইয়সজেনিনের নতুন কোন উৎসসন্ধনানের প্রয়োজনের কথা চিন্তা করা হচ্ছে। দেখা গেছে ভেষজ উদ্ভিদের গুনাগুন বিচারের সময় অনেক সংখ্যক নমুনার বিশেষ পরীক্ষার প্রয়োজন হয়। তাই এই সমস্ত নমুনার মধ্যে ডাইয়সজেনিনের অস্তিত্ব এবং তার পরি মাপের জন্য চাই এমন এক সহজ পদ্ধতি যার ফলে খুবই কম পরিমান নমুনা দিয়ে এই অনুসন্ধান চালানো সম্ভব। তাছাড়া এই ধরণের পদ্ধতিতে অতি স্বল্প মূল্যের কলোরিমিটারে ব্যবহার করা উচিত যেটা যেকোন ল্যাবরেটরীতে সহজলভ্য হয়ে পড়ে।

এই গবেষনা পত্রে এক নতুন ধরনের এবং খুব কম সময়ে ডাইয়সজেনিন পরিমাপ করা যায় এমন এক পদ্ধতির কথা বলা হয়েছে। এই পদ্ধতির দ্বারা কালিমপঙের বিভিন্ন বন্য প্রজাতির ডাইয়স্করিয়ার মধ্যে ডাইয়সজেনিন পরিমাপের সম্ভাবনার কথা উল্লেখ করা হয়েছে।

APPLICATION OF A NEWLY ESTABLISHED COLORIMETRIC METHOD FOR QUANTITATIVE ESTIMATION OF DIOSGENIN IN SOME WILD SPECIES OF *Dioscorea* AVAILABLE IN KALIMPONG, WEST BENGAL

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In pharmaceutical industry, diosgenin is generally utilised for the preparation of 16-Dehydropregnenolone acetate which again is required for commercial production of cortisone and contraceptive pills. Now a days, the production of diosgenin out of conventional sources is not sufficient enough to cope with the rapid increase of population in India. For this reason searching of new source of it is very much needed. Besides, during evaluation of drugs it is required to handle a large number of samples and for which an easy and rapid method for estimation of diosgenin on microscale with the help of easily available low cost apparatus like colorimeter, is necessary.

This paper deals with the establishment of a new and rapid method for quantitative estimation of diosgenin, with the help of which wild species of *Dioscorea* available in Kalimpong has been investigated for understanding of their diosgenin content.