Potentiality and relevance of herbal and traditional medicine for promotion of health and development of tribal economy in Andhra Pradesh

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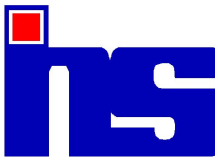

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THE INSTITUTE OF HEALTH SYSTEMS

THE GIRIJAN CO-OPERATIVE CORPORATION
VISHAKAPATNAM, ANDHRA PRADESH

Potentiality and Relevance of Herbal and Traditional Medicine for Promotion of Health and Development of Tribal Economy in Andhra Pradesh

November 1992

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POTENTIALITY AND RELEVANCE OF HERBAL AND TRADITIONAL MEDICINE FOR PROMOTION OF HEALTH AND DEVELOPMENT OF TRIBAL ECONOMY IN ANDHRA PRADESH[1]

1. THE BACKGROUND OF THIS PROJECT

The Girijan Co-operative Corporation (GCC) of Andhra Pradesh operate in the remote tribal areas of the state and provide marketing and short term credit support. The corporation procures significant quantities of non wood forest produce from the tribals and sells them in the national as well as international market. The objective is to ultimately give the tribal a fair price for this forest collections. The corporation works in close collaboration with the tribal welfare department of the state including the Integrated Tribal Development Agencies (ITDAs) and other service departments of the government in the tribal areas. Recently there has been growing realisation that the sub tropical forest which is the natural habitat of the tribals provide an enormous source of herbs. Traditionally the tribals have been using various herbs and herbal preparations for various kinds of ailments. The traditional practitioners of medicine in these areas possess a

[1] Prepared by the Institute of Health Systems, DMS Complex, Sultanbazar, Hyderabad. AP 500 195, India.

repertoire of ethnobotanical information which is likely to be lost unless specifically cared for. On the other hand the formal Primary Health Care set up has not been able to achieve its objectives in the tribal areas due to various factors. Convergence of traditional and herbal medicine with the primary health care program of the state is likely to improve the efficacy of the health intervention programs and provide cost effective and culturally compatible solutions to the tribal people. On the other hand herbal based pharmaceuticals are gaining wider acceptance in the industrialised economies and urban areas. As a result sale of herbal based pharmaceutical has been increasing in the national and international market at a rate higher than the traditional pharmaceuticals. A good part of the modern pharmaceuticals were developed on the basis of chemicals, structural and functional insights gained from the based sources. The intellectual property right of the traditional inhabitants of the area from where the basis plant material, leading to the discovery of new drugs, is collected is being increasingly recognised. Thus herbal and traditional medicine provide simultaneously two opportunities. Firstly the scope of improving the cost effectiveness of primary health care programs in the tribal areas and secondly the economic potential of herbs collected by the tribals in the growing herbal pharmaceutical industry. An additional aspect is the positive impact on the environment. Herbs are a type of non wood forest produce. By providing economically viable alternatives, herb collection can provide the necessary respite to the deforestation caused by a wood based exploitation strategy. Thus this project report has two main themes. Herbal and traditional medicine based integrated health system for tribal areas of Andhra Pradesh and economic potential of herbal resources of the tribal areas involving issues of procurement, marketing, protecting the intellectual property rights of the local inhabitants etc.

2 CONVERGENCE OF TRADITIONAL HERBAL MEDICINE AND PRIMARY HEALTH CARE IN TRIBAL AREAS OF ANDHRA PRADESH

2.1 Materials and Methods:

Background material was collected on the state of health care delivery system in tribal areas of AP, it's morbidity status etc. Literature on studies made on traditional and herbal medicine as well as other relevant literature were collected. A background paper was prepared. A four day workshop of selected specialists in the area of herbal and traditional medicine as well as officials handling the primary health care set up was convened at Visakhapatnam between 18th to 21st June, 1991. On the first day the workshop discussed about problem definition. The participants then split into two groups and visit the tribal areas of Paderu and Rampachodavaram respectively. Each group touched the PHC, took the PHC Medical Officers along with them and proceeded to visit the traditional medicine men. At some places casual gatherings of a group of traditional medicine men was also organised. The report of the two groups are in Annexure-9 at page 41. On the fourth day the workshop was continued at Vizag. All issues were discussed in the light of the findings in the field study trips, the available literature and the participants own experiences.

All studies and field reports on traditional and herbal medicine done in Andhra Pradesh have been referred and their findings made use of. Most of the studies in different parts of India have also been taken into account. Apart from this bibliographic search on MEDLINE and POPLINE were done to look for the world literature on the subject. Studies from various parts of the world provide an insight into the role of traditional and herbal medicine and how different societies have tried to secure the benefits from both traditional and modern systems of medicine.

2.2 Role of Health Care Delivery System in Tribal Area Development:

Studies[2] conducted among various tribal groups in Andhra Pradesh indicated crude death rates varying from 15 per 1000 for Savaras, 16.5 for Konda Doras, 17.5 for Gadabas and 19.48 for Jatapus. These rates are higher than the State average of 9.9 per 1000 and national average of 12.6 per 1000. For the tribals, whose subsistence agriculture procurement of forest procedure requires daily work, staying healthy is essential for household food security.

Health care facility is the most important felt needs of the Tribals. It has a great degree of emotive value to the tribals as well as all those who are concerned with their welfare. On the other hand provision of a satisfactory level of health care facility in the tribal areas is fraught with many difficulties, compared to what is the case in general. Firstly there is the problem of socio cultural factor affecting accessibility of existing modern medical infrastructure to the tribals. Secondly the problem of economic viability in making available reliable services to widely dispersed population and inaccessibility of their habitations. Thirdly the socio-cultural attributes of the health care providers (i.e. The health workers) affecting their own availability to the local population. Convergence of herbal and traditional medical resources along with the modern medical resources in the tribal areas assumes significance in this context. Only then it may be feasible to overcome the complex problems in the journey towards a satisfactory health facility for the tribals.

2.3 Scientific Basis of Health Medicine:

Farnsworth[3] has reported that there are 121 drugs of known structure that are still extracted from higher plants and used globally in allopathic medicine. About 74% of these were discovered by chemists who were attempting to identify the chemical substances in the plants that were responsible for their medical uses by humans. These 119 plant derived drugs are produced commercially from less than 90 species of higher plants. Since there are at least 250,000 species of higher plants on the earth, Farnsworth argues, it is logical to presume that many more useful drugs will be found in the plant kingdom if the search for these entities is carried out in a logical and systematic manner. The first and most important stage in a drug development program using plants as the starting material should be the collection and analysis of information on the use(s) of the plant(s) by various indigenous cultures.

Various studies and investigations have yielded positive pharmacological basis for many traditional, folk and herbal medicine, world wide. Several studies have demonstrated the promise of solutions or better alternatives to problems here to fore unresolved in the modern medical system. Following are just a small sample of results picked up from a MEDLINE search on traditional / herbal medicine for a few recent years.

Presber[4] et al report that existing cross resistance to structure analogous antimalarials causes the need to find new active compounds against malaria parasites. For this purpose the traditional medicine of tropical countries provides a treasury of opportunities. For example a root extract of Cochlospermum angolense showed in vitro, a remarkable activity against Plasmodium berghei in the DNA synthesis measurement with 3H-labelled hypoxanthine. This effect could be reproduced under in vivo conditions with the “4-dat suppressive test” of rodent malaria.

[2] Andhra Pradesh Tribal Development Project, Appraisal Report, Working Paper No 8, International fund for Agricultural Development, Asia, 1990.

[3] Farnsworth norman R; Djoja D. Soejarto; Global importance of medicinal plants, in O. Akerele et al.eds Conservation of medicinal plants, Cambridge University Press, 1991 pp25-61.

[4] Presber W; Herman D.K.; Hegenscheid B, [The effect of an extract from Cochlospermum angolense (“Burututu”) on Plasmodium berghei in the mouse malaria suppression test], Wirkung eines Extraktes aus Cochlospermum angolens(Burututu”)auf Plasmodium berghei im Mausemalaria-Suppressionstest.

Traditional healers in Uganda[5] use a great variety of herbs in the treatment of diarrhoea. However almost all of them (97%) used water as the main vehicle for their herbal preparations. 26.4% of the healers considered fluid supplements as mandatory and 70.5% advised patients to take as much fluid as possible. Such practices, with further reinforcement of the crucial therapeutic principle like that of fluid supplementation can be used to secure the energies of traditional practitioners for promotion and treatment of important public health problems like diarrhoea.

Animal studies as well as clinical trials[6] of Vicoa India (locally called Banjauri and used by Adivasis in Bihar) has confirmed the contraceptive properties of the plant.

The antifertility properties of Gossypol have been discovered from natural products and on the basis of leads from cotton growing districts of China[7].

Orgungbanfila[8] et al reported that Alcornea cordifolia, widely available in tropical Africa and extensively used in traditional medicine for coughs and bronchial troubles etc has been shown to contain smooth muscle relaxing flavonoids in its leaves.

Geisberger[9] et al reported that extracts of B.Pilosa, commonly used in traditional medicine, has been found to contain substances known to be having antimicrobial activities and inflammatory flavonoids. This could be the rationable for its use in traditional medicine for the treatment of wounds, inflammations, and against bacterial infections of the gastrointestinal tract.

Dimayuda[10] et al report that the medicinal plant Lepechinia hastata, used as a remedy against uterine infections in Baja California Sur (Mexico), has been shown to contain carnosol as the main diterpenoid secondary metabolite, which has potent in vitro antimicrobial activity.

Esposito[11] et al report that Cajanus Cajan and Cassia fistula are two plants used in Panamanian folk medicine for treatment of diabetes. The aqueous fraction of these were shown to have in vivo hypoglycaemic effect on diabetic patients.

Chen[12] et al report that the Chinese traditional medicine Xiao Chai Hu Tang (XCHT), has been shown to have fairly good result on cases of chronic active hepatitis.

Manasvi[13] et al report that the Thai traditional medicine Ma Klua for intestinal parasitic infestations have been shown to be effective against hookworm infestation. The medicine is reportedly being used by the Thai helminthisasis control project, since 1969.

[5] Anokbangu....

[6] Dhal K., Dongra M.; Phase I and II clinical trials with Vicoa India (Banjauri), a herbal medicine, as an infertility agent; Contraception 1988; 37(1): 75-84.

[7] Huang L., Zhou J.; Natural products and their contribution to Chinese Health; Impact of Scinece on Society; 1984; (136): 313-20.

[8] Ogunbamila FO; Samuelson G, Smooth muscle relaxing flavonoids from Alcornea cordifolia, Acta-Pharm-Nord; 1990; 2(6); P 421-2

[9] Geisberger P; Sequin U, Constituents of Bidens Pilosa L: Do the components found so far explain the use of this plant in traditional medicine?, Acta-Trop-(Basel): 1991 Feb; 48(4); P 251-61.

[10] Dimayuga RE; Garcia SK; Nielsen PH; Christopherson C, Traditional medicine of Baja California Sur (Mexico). III. Carnosal:a diterpene antibiotic from Lepechinia hastata, J-Ethnopharmacol; 1991 jan; 31(1); P 43-8.

[11] Esposito Avella M; Diaz A; de Garcia I; de Tello R; Gupta MP; Evaluation de la medicina tradicional; efectos de Cajanus cajan L.(Guandu) y de Cassia fistula L. (canafistula) en el metabolismo de Los carbohidratos en el raton, Rev-Med-Panama; 1991 Jan: 16(1) ; P 39-45.

[12] Chen NL; Gu F; Jia KM, [Chronic active hepatitis with super infection of delta virus and hepatitis B virus: treatment with Chinese traditional medicine], Chung-Hua-Nei-Ko-Tsa-Chih; 1990 Mar; 29(3); P 144-6, 189.

[13] Manasvi-Unhanand; Srinophakin; Taweesak-Seedonrusmi; Chawalit-Jeradit; Somasak-Nilapan; Anek-Sathilayathai in Asian Parasite Control Organization (APCO). Collected papers on the control of soil transmitted helminthiases. VoII . Tokyo Japan, APCO 1980, 289-300.

2.4 Economic Basis of Herbal Medicine:

The twenty fifth session of the South East Asia Regional Committee of the World Health Organisation held in Colombo in 1972 mooted the idea of using the practitioners of traditional medicine to help and improve the coverage of health services. In 1976, the twenty-ninth World Health Assembly took note of the role that traditional medicine could play in the extention of health services, particularly to the remote rural areas.

The Alma Ata assembly of World Health Organisation recognised the importance and possible contributions of Traditional Systems of medicine towards the fulfilment of the Health for all goal by the year 2000AD. The National Health Policy, 1982, envisaged that planned efforts be made to dovetail the functioning of practitioners of various traditional systems and integrate their services, at the appropriate levels, within specified areas of responsibility and functioning, in the overall health care delivery systems. Specially in regard to the preventive, promotive and public health objectives.

Yunus writes that "for Bangladesh, implementing the WHO's definition of primary health care in terms of modern medicine is financially impossible; there fore it is imperative to use the vast resource of indigenous Ayurvedic drugs. These herbal medicaments have the advantage of low cost, universal availability, absence of side effects and efficacy.[14]

Tan[15] reports that the Philippines government are promoting herbal medicine on account of its lower cost. This is reflected in the non governmental organisations community based health programs (CBHP), which actively employ traditional medical practitioners and promote the utilisation of traditional therapies.

2.5 Harmful Effects of Traditional Medicine:

Several studies have also revealed the need for caution and understanding the possible harm that herbal and traditional medicine may cause. Delayed referral to an appropriate system of medicine due to continued hope of a cure in the traditional medicine can be cause for concern.

Harris et al report that there was delay in treatment or referral of meningitis cases in Vanuatu, because patients were seeking traditional medicine. Alabi has reported many negative practices in Nigeria affecting the health of women and children. Some of these are bathing of new born baby in boiling water resulting disfigurement, ghisiri cut a crude local symphysiotomy leading to vesico vaginal fistula in many young girls etc. the WHO seminar on traditional practices affecting health of women and children in Africa identified practices like female circumcision, food taboos and certain traditional practices during pregnancy and lactation, child marriage to be harmful. Maguire reports an association between herbal medicine ingestion to diarrhoea and renal failure.

Long term adverse impact of non adoption of aseptic techniques by traditional birth attendants (TBA) has been observed.

2.6 Current Status of Traditional Medicine in India, What it can Contribute to the Health System:

It is pertinent to recognise the native concepts of health and disease. Tribal perceptions of disease and medicine, however, are in terms of curative not preventive care. Where a tribal person goes for treatment also largely depends on what attribute is perceived as the cause of the malady and the relative degree of success of the first line of care. Self care is largely carried out by use of

[14]Yunus A.B.; Herbal medicine in primary health care, IN TOUCH, 1986 May-Jun; 10(79) : 17-8.

[15]Tan-ML; Querubin-M: Rillorta-T, The integration of traditional medicine among community based health programmes in the Philippines, Journal of Tropical Paediatrics, 1988 Apr; 34(2) : 71-4.

medicinal plants procured from forests, after incurring illness. Hasan broadly distinguished between the social and cultural determinants of health and the socio cultural response to disease. The socio cultural determinants are the factors that directly affect the health of the community because certain customs and practices create and environment that helps in the spread or control of certain diseases. The socio cultural response to disease relates to the problem of medical care to the sick and the invalid. Both the socio cultural determinants and the responses can be functionally positive (ie.., health promoting and curative) or negative (ie.., adversely affecting health or the cure from a disease).

Almas Ali[16] on the basis of a comprehensive survey of literature observed that the most distinguishing characteristic of traditional medicine is the notions regarding disease causation. Here in one finds extremely close relationship between medicine and such aspects as religions, morality and magic.

Sociologists and anthropologists have recognised the importance of confident prognosis as an attribute of the role of the healer. Traditional medicine establishes faith and assurance in the patient. Modern medicine lacks this "aura of conviction" of traditional medicine.

The Bangalore seminar[17] on tribal health noted that almost all tribal groups believe in the presence of supernatural forces of evil spirits. Wrath of gods or witches as the cause of disease. Hence in addition to medicines, almost all traditional tribal healers include incantation, exorcism and sacrifices to gods. In addition, the seminar noted many positive and negative traditional tribal practices related to health. For example the practice of conducting deliveries, with the mother in the squatting position, is now considered scientifically to be the most efficient way of conducting normal deliveries. On the negative side the un hygienic cord cutting practices during child birth, leads to high incidence of puerperal sepsis and neonatal tetanus etc. Food taboos against certain nutritious and protein rich food, during pregnancy, to avoid excessive bulk of child were also reported.

It was noted that most of the traditional healers, particularly among tribes who maintain livestock, treat both humans as well as animals. They tend to combine spiritual and faith healing methods such as exorcism, prayers, sacrifices, with genuine herbal remedies for common ailments.

An extensive field investigation into tribal medicinal practices of Bihar, West Bengal, and Orissa by Sibani Mallick and KK Chatterjee showed that satisfactory treatment for certain common ailments was being provided by the tribal doctors using local herbs. The ailments treated satisfactorily were Pyrexia of unknown origin, viral fever and malaria (76% satisfactorily treated); gastroenteric disorders (63% of cases satisfactorily treated); respiratory diseases 63%; non specific arthritis 26% (and some relief in an additional 20% of cases); dermatitis 33% satisfactory treatment, and an additional 30% partially relieved; worm infestation 28% cured, otitis media satisfactorily treated in 48% of cases; and conjunctivitis in 48%. In cases of rheumatoid arthritis, the investigators found an efficacy of 70-80% (cures) which is probably higher efficacy than that of the average allopathic treatment regimen for rheumatoid arthritis. However, the number was small and they could not follow up the cases to report long term results.

It was observed by the investigators as well as other tribal health workers that sometimes, resistant dysentery not amenable to modern treatment were cured by herbs provided by Santhals of Orissa.

[16] Ali Almas, Indigenous health practices among tribals: Relationship with prevalent disease; Workshop on genetic and socio cultural determinants of tribal health, measures for health development, NIHFW, 1986.

[17] Health and development of the tribal people in India, present steps and proper directions, India society of Health Administrators, 104(15/77)Cambridge Road Cross, Ulsoor, Bangalore - 560008, 1990.

These figures compare quite well with cure rates of modern medicine. The seminar noted that advantages of incorporating traditional medicine into primary health care programs becomes obvious, even in terms of economics of a PHC program, considering the high prevalence of these conditions in addition to other problems, and the limited resources that can be allocated for drugs.

There are other practices which sound unconventional but seriously merit evaluation not only to implement as appropriate technology among the tribals but also for the benefit of the general population. In this connection, it may be recollected that tribal knowledge has been the source of many valuable medicines used today. The reserpine extracted from Rauwolfia Serpentina, quinine from Cinchona bark, ginseng and many other herbal remedies, can be traced to chance contacts with the tribals.

2.7 What Would the Tribals and People Prefer?

It is pertinent to appreciate the tribals preference and understanding of various alternate systems of medicine. This question has been raised in many studies. The commonly held dream of many intellectuals is that everything traditional and herbal is beautiful and works, if only the polluting effect of the modern medicine were not there! How far this view is borne out by facts? It would be worth the while to appreciate some relevant research findings in this area.

[1] In 1985, the planning department of Andhra Pradesh commissioned a quick evaluation study[18] of existing PHCs with non allopathic clinics, to study the peoples preference to various systems of non-allopathic medicine[19]. The composition of patients in this study attending the different clinics showed that a large proportion of those attending Ayurvedic and homeopathic clinics were having a higher level of literacy status compared to those attending the allopathic clinics. It was found that while 73% patients in the allopathic clinic were illiterates, only 48% of the non allopathic clinic patients were illiterates. Matriculates and above constituted about 5 percent of the allopathic patients, their proportion was round about 1/10 of the patients for non-allopathic clinics. Thus, there appeared to be a tendency for the educated to prefer non-allopathic system which was more pronounced in the case of Ayurvedic system. Regarding occupation pattern it was observed that cultivators and agricultural labourers accounted for about 70 percent of the patients for allopathic clinics. Where as this proportion was 48 percent for non-allopathic clinics. Non agricultural labourers, artisans and other occupation group accounted for higher proportion for non-allopathic clinics compared to allopathic clinics. Similar analysis was attempted according to the broad income groups of the beneficiaries. While the lowest income group i.e.. (Rs. 300 and below per month) accounted for about half the patients among the Allopathic clinic patients, its proportion was only 36.2 percent for beneficiaries of non-allopathic clinics. The reverse tendency was observed with the middle income group (Rs. 301-500 per month), the proportion being respectively 18.7 percent and 34.8 percent. However, in the higher income group of Rs. 501 and above per month, the patients constituted about 29 percent for both Allopathic and non-allopathic clinics.

[18]Evaluation Report on Primary Health Centers with attached non allopathic clinics in Andhra Pradesh, 1985, Government of A.P., Finance and Planning (Planning Wing) Department, Evaluation Wing, Hyderabad.

[19]The order major objectives of the study were;

1. To study the functioning of the non-allopathic clinics attached to PHCs
2. To study how far the professional integrity of the non-allopathic system is retained by being attached to allopathic oriented PHCs.
3. To suggest the desirability or otherwise of expanding and attaching the non-allopathic clinics to all other PHCs, in the state or whether to expand the facilities of non-allopathic systems of medicine in rural areas independently.

The study noted that there is a general feeling among the public that the Allopathic and non-allopathic systems of medicine are capable of playing a complementary role in the expansion of medical facilities in the rural areas.

The Andhra Pradesh Tribal Research Institute (APTRI) made a study[20] of the health services in Tribal Sub Plan areas of Andhra Pradesh in 1978. Some of the objectives of this study were:

1. To study the extent of coverage of the medical and health institutions, in relation to the area, type of population and disease coverage.
2. To study the extent of utilisation of available medical and health services by different cross sections of the population and their attitude towards modern medical and health services.
3. To study the tribal man in relation to magic religious practices and use of native medicines for different diseases.

This study collected data from four types of clusters in the sample blocks. The clusters were drawn up on the basis of following criteria:

1. Around the Primary Health Centres.
2. Around a sub-centre.
3. Around other medical institutions like Ayurvedic Dispensary.
4. Area not covered by any of the medical institutions.

In each of the above clusters 3 villages are selected based on the following criteria

1. The head quarters village of the institution.
2. Second sample village situated less than 5 miles from the institution.
3. Third sample village situated more than 5 miles from the institution.

In the fourth cluster only two villages are selected at random since there is no medical institution. In this way it was expected to have an idea of the benefit from each type of institution accruing in the village of its location, at a small distance from the institution and in villages far off from the institution. The last two villages where there was no institution would represent the general situation in the area.

The analysis revealed that the Government medical institutions in tribal areas were serving the needs of the patients in and around the medical institutions. The interior areas were mainly depending on the Mobile Medical Units. Many of the tribal patients did not take any treatment, leaving it to fate. The percentage of patients who did not take treatment increased from the primary health centre headquarters to the interior areas. The role of native doctors was very high in the Munchingput block. Private practitioners were consulted for serious ailments in advanced areas.

In the cluster around the PHCs, about 65% of the patients preferred the primary health centre for seasonal, chronic and other common diseases. Nearly 50% of the patients involved in accidents also preferred primary health centre. The hospital and missionary hospitals were preferred only for chronic diseases. In spite of the existence of sub centres with ANMs very few tribals are utilising their services for deliveries. The tribals consider that the delivery is a natural phenomenon and does not require any medical assistance. Further, they fear that the outside women pollute their house holds. None of the women were preferred to go to the hospital for delivery. However more number of near the institutions are utilising the services of ANMs. Perhaps lack of education and contacts are the main reasons for not utilising the services of ANMs. (75%) of the tribals prefer home delivery. Only 25% preferred the ANMs. About 13 to 26% of the patients excluding

[20]Health Sevices in tribal sub plan areas of Andhra Pradesh .....1978.

maternity cases preferred to consult private practitioners. Native treatment was preferred by about 20% for seasonal diseases, and accidents.

In the clusters away from the PHCs also the hospitals were preferred for chronic diseases and accidents. All the maternity cases in these clusters preferred to be attended at home only.

The study made an attempt to find out the tribal's views regarding utilisation of modern medical facilities by contacting heads of households in different blocks. It was observed that 24.19% of them had immense faith in the efficacy of native cures and home remedies and have no belief in modern medicine. These people were not willing to go for modern medicine under any circumstances. Another 9.16% could not give any specific reasons. The rest of 66.57% of the people believed that modern medicine is more effective in treating diseases. Out of whom 32.77% had actually availed modern medical institutions for different ailments. Another 33.80% of the tribal households could not avail the services of the medical institutions for different reasons though they had belief in modern medicine. The location of the medical institutions is the most important factor in attracting tribal patients. The primary health centres at some blocks are located in predominantly nontribal areas, or at a corner of the block and could not attract the tribal patients.

The Chaudhury's[21] based on a review study of tribal health disease and treatment noted that "quite often it is said that the tribals are so tradition oriented that they do not use the modern facilities. Perhaps there is a need to examine it properly. Some studies have indicated the strong faith in traditional methods of treatment, but again a number of studies have shown that the two methods of treatment, traditional and modern, operate side by side in the same situation. In fact, the inadequate nature of modern facilities available in most of the tribal areas are often responsible for the lack of faith in modern treatment.

Chaudhury's study[22] on use of traditional medicine revealed the fact that the awareness, and practice of modern ways and means of treatment is gaining ground in the rural areas of Palamau instead of traditional ways. The study noted that possibly instant action, ready availability and self-sufficiency were in favour of modern science. In comparison, the herbal medicine, as reported generally, take longer period to cure the patients. It also requires other ingredient to achieve full potency that may not be easily procurable in the villages. And probably for this reasons, the study noted herbal medicines were being sold in the streets of Daltongunge and were not very much available. Together with this, the non availability of the indigenous herbs, etc., possibly due to the wanton destruction of forests surrounding villages, and the dearth of knowledge among the current generation of the local "medicine man" have possibly created aversion to such system of treatment among the ruralites of Palamau.

The main finding of a study by Sahu[23] among the Oraons was that in responce to various health problems encountered by them they actively seek health services outside their culturally determined health institutions manifested in the form of witch doctor (Bhagamati), Priest (Pahan) Dai (Kushrain), etc., to get relief. It was found that a very large proportion of their felt needs for such services remain unmet because of limitations in their access to these health institutions. Access to health institutions was found to form the pivot which determined the health behavior of Oraons.

[21]4. Chaudhuri Budhadeb of Tribal Welfare, disease and treatment in Budhadev Chaudhuri Ed. Tribal Health Socio-cultural dimensions, New Delhi. 1986.

[22]Chaudhuri Anirudha, some finding on the use of Traditional medicine in the rural areas of Palamau, Budhadeb Chaudhui Ed. "Tribal Health, Socio Cultural dimensions", New Delhi, 1986.

[23]5. Sahu. S.K., Social dimensions of health of tribals in India- a case study of Oraons of Orissa, Budhadeb Chaudhury Ed. Tribal Health. Social Cultural Dimensions, New Delhi 1986.

Apart from the availability of such health institutions within the village/city, social, religious, economic and political factors determine the access of Oraons to health institutions.

Ramachandran's study in Tumkur district of Karnataka dealt with the patterns of movements of the rural population for the purposes of medical treatment. He tested his hypotheses using data from 245 randomly selected sample villages containing about 30000 households. The study failed to establish any significant differences in the incidence of sickness between various socio-economic groups nor could it support the hypotheses that poorer sections of the rural society tend to get treated by informal, traditional systems of medicine.

A study in Salem[24] found an inverse relationship between number of people using Sidha system of medicine and income, education and distance traveled. Both modern and Sidha medicine were found to be supportive to each other rather than competitive. People tend to seek both the systems in search of a permanent care.

Thus studies on tribal health behaviour have revealed that though there are innumerable types of beliefs and practices, the one thing that is common among all health seeking behaviour is the faith on empiricism. It is the empirical result that is valued most, irrespective of the system of medicine and the healer. A hospital, health centre or a health worker are very much open alternatives to the tribal, as his traditional healer and offerings to god. Swain[25] observed that the western medicine when available was accepted and the magico religious system did not come in conflict with the western medicine. Wherever facilities are available their system of health seeking has tilted in favour of modern medicine. Almas Ali[26] found that among the Lanja Saoras of Orissa, there was no significant cultural resistance to acceptance of modern medicine as long as they are efficacious, are available and accessible to them.

2.8 The Strength of Herbal and Traditional Medicine:

Thus the strength of herbal and traditional medicine lies in:

1. Its labour intensiveness as a medical technology,
2. Local resource base,
3. Appropriateness of the herbal medical technology to certain agreed and common ailments.
4. The positive behavioural, social (psychosocial) attributes of the herbal system leading to positive psychosomatic responce.
5. Recognised empirical effectiveness against certain diseases for which satisfactory treatment in modern medical system is not currently available.
6. The potential of new discoveries.

2.9 Disease Pattern of the Population:

The APTRI study[27] analysed the common diseases reported by the sample population. It was observed that fevers were the most common diseases in all the areas. Fevers account for

[24]Ramesh A: Hyma B; Srinivasan N; Utilisation Pattern of Sidha Clinics in Salem, Tamil Nadu; Geographia Medica; 1989; 19:151-61.

[25]Swain, Saraswati "Health disease and Health seeking behaviour of tribal people of India, workshop on Genetic and socio cultural determinants of tribal health measurers for health development, National Institution of Health and Family Welfare. New Delhi 1986.

[26]Ali Almas, Food habits, nutrition and health status of the Lanja Saoras. A primitive tribe of Orissa, paper presented in the symposium on tribal nutrition held at Nation Institution of Nutrition, Hyderabad, 1986.

[27]1978

14.62% in Polavaram block, 10.32 in V.R.Puram 9.36% in Munchingput block and 4.64% in Utnoor block. Among the fevers malaria was the most common, accounting for 14.13% in Polavaram, 9.62% in V.R.Puram, 8.50% in Munchingput, and 2.52% in Utnoor. Other non-specific fevers were also reported in all blocks. The incidence of Malaria was more in interior areas i.e., cluster 4 in all the blocks. Next to Malarial fevers, skin diseases especially scabies was also observed in all the selected blocks. The incidence of scabies was high in the backward blocks, of V.R.Puram (8.18%) and Munchingput (5.17%) as against 2.46% in Utnoor and 1.82% in Polavaram. Cluster 4 in V.R.Puram block reported 21.16% of persons suffering with scabies. Respiratory tract diseases also account for 2.21% to 3.60%. The highest incidence was observed in Utnoor block (3.60%). Tuberculosis was observed in clusters No.1 and 2 in most of the areas, revealing that people having outside contacts were more prone to this disease. Other common respiratory diseases were cough and cold. Next in importance were the digestive tract diseases such as dysentery and diarrhoea, stomach-ache, constipation etc., which account for 2.40% in Utnoor, 1.75% in Polavaram, 0.78% in V.R.Puram and 0.77% in Munchingput. Apart from these diseases E.N.T diseases, Ophthalmic diseases, wound etc., were also reported.

A health and morbidity survey of tribal population in Visakhapatnam district[28] found that the leading causes of morbidity, in order of frequency (per 1000) were nutritional deficiency disorders (489), G.I tract. Disorders (112.9), eye diseases (46.0), skin disorders (45.4), respiratory disorders (42.9), C.N.S.Disorders (20.3), bone and joint diseases (20.3), Malaria (17.9), Glycosuria (13.5), congenital malformations (9.2), E.N.T diseases (8.7) and leprosy (1.9).

An analysis by the IFAD project team[29], of out patient's registers maintained at the primary health centres, sub centres, and taluk hospitals during preparation and appraisal missions indicated that among adults the most common diseases for which treatment was sought were respiratory infections (tuberculosis and bronchitis), fevers (including malaria), alimentary diseases (peptic ulcer, hyperacidity, dysentery) and aches and pains. Among children, they were gastro-enteritis (diarrhoea), respiratory infections, fevers, scabies, skin infections, and malaria. Malaria is of epidemic proportions in most ITDAs such that the Multipurpose Health Workers (Male) have all been assigned away from subsidiary Health Centres to work on the government sponsored Malaria Eradication Programme.

Thus the most common diseases in tribal areas were malaria fever, scabies, respiratory tract diseases and digestive tract diseases. Malaria and scabies were more prevalent in interior areas, while common ailments like headache, tuberculosis etc., were more in the advanced areas.

2.10 The Existing Health Care Set Up in Tribal Areas, It's Strength and Weakness:

The APTRI study had identified that out of 66.57% of all tribals who believed in modern medicine, about half (33.80%) could not avail the services of the medical institutions. The study ascertained the reasons of non availment. The various reasons given by those who could not attend medical institutions in spite of having belief are as follows;

Out of the 141 members, 66(46.81%) could not attend the hospital due to financial troubles, 49 (34.75%) could not attend, as the institutions are situated in distant places, 15 (10.64%) feared that the doctors will not treat them well, 9 (6.38%) have no other members to look after their family if they go for hospital treatment, and 2 (1.42%) have fear complex to meet the

[28]Rao Madhav S., Health and morbidity status of Tribal Population of Visakhapatnam, Andhra University Thesis - 1983.

[29]Andhra Pradesh Tribal Development Project, Appraisal Report, Working Paper No 8, International Fund for Agricultural Development, Asia, 1990.

doctors. Thus financial troubles and distance are the main reasons for not availing medical institutions apart from blind faith in native cures.

Though two medical officers were sanctioned for all the PHCs only one medical officer was actually in position at many of the PHCs. The services of the Medical Officers are utilised for emergency duties in other areas. Even the posts of compounders were kept vacant for longer periods. Consequently at such times the institutions are run with the paramedical staff only.

The PHCs have been observed to carry on the preventive work in a better way. As the tribal areas are covered by special nutrition programme and other child health programmes; it was observed that immunisation was carried satisfactorily in tribal areas. As the forward areas among the tribal blocks were selected for special coverage by medical colleges, as well as for starting special programmes like ICDS the immunisation programme in the advanced blocks was far better than in the back ward blocks.

One of the major draw backs in the infrastructure of the medical institutions in tribal areas is lack of specialist services. There are no arrangements for treating diseases like T.B., Surgical diseases and diseases of women. The medical officer has to refer such cases to the district head quarters hospital, which the innocent, poor tribal patient cannot afford to attend. The ignorant tribal patients do not understand the difficulty and feel that the medical officer does not like to treat them and loose faith in the institutions.

Visits to tribal areas, discussions with health department officials, peoples representatives brings out the vacancy position as the foremost problem of health care delivery institutions in tribals areas. A large number of posts sanctioned in the institutions located in the agency areas remain vacant due to non availability of personnel or unwillingness of personnel to work there once they are posted. This position is true for staff in all categories and in all levels. The vacancy position in health care delivery institutions within the agency is disproportionately higher than what it is in the plain areas.

The reasons behind the disproportionately high vacancy position are many. The remoteness of the agency areas, the real difficult living situation, the perceived difficulties in living situations and the role of political and bureaucratic pressure to secure comfortable postings to the favoured ones are a few well known causes. Apart from this there are other significant contributory factors. Absence of definite transfer and posting policy is a major contributor to the situation. Despite a few employees managing better postings through influence it should have been possible for the government to persuade the majority of the employees who are without much of a politic or bureaucratic back up to accept postings in tribal areas. Unfortunately this has not been possible because transfer to tribal areas have come to be perceived as a kind of positively punishment posting. This is because, if at all an employed is willing to work in tribal areas for some time, he is not prepared t express this or accepts such a posting to start with, because he is apprehensive that the may be permanently dumped in the agency areas. There is a tendency on the part of the cadre management authorities to forget those of their members who are posted in tribal areas and report there, till such time as he is able to bring enough political or bureaucratic pressure to come out of these areas. Thus the present transfer and posting policy suffers from two important problems. On the one hand it is not able to make all people into the agency areas for a reasonable period, it is not able to reward him in the shape of a choice in the subsequent posting etc. Though there have been instructions from time to time, requiring mandatory postings in agency areas it has not been possible for the cadre management authorities to follow then. Even recruitment taken up by the Directorate of Health exclusively for the tribal areas has not been able to ensure continuous availability of the

services of those recruited under the scheme in tribal areas. Many of them have managed their way into nontribal areas and teaching institutions, right from the beginning.

Another important problem is the general shortage of material resources and particularly drugs and therapeutics. In this areas, it is again a problem of appropriateness of supplies rather than a shortage of resources. The morbidity pattern of the agency areas are different, than the rest of the State. The drugs and therapeutics and logistics management of the regular health services in the State need improvement. So the agency also suffers on account of the same. Apart from all this the ITDAs have been spending some money towards purchase of drugs and therapeutics to supplement the supplies in the Medical Department. Such a kind of arrangement can lead to a lot of duplication and leakage of resources. In the Commissionerate of Medical Services (APVVP), it has been found that it is possible to improve the drugs and therapeutics by exercising a degree of operational autonomy and freedom in stabilisation of resources. All these have not been possible under the Directorate of Health because of the very fixed budgeting system and the centralised budgeting system. Another important contributory factor in non availability of material and resources is the remoteness of agency materials and supplies. It is common knowledge that the transportation cost to tribal areas is always more than what it is for plains. Thus supplies to agency areas is not likely to be as remunerative as supplies to plains areas. Unless there is a mechanism for realistic quotation from supplies, the reliability and quality of supplies to the agency medical and health institutions will always suffer. The problem of accessibility is of course originating from the peculiarity of agency area rather than the health care delivery system itself. The average tribal is not well equipped to avail the services of various modern institutions created by the Government. Health care delivery institutions are one such category. In the more developed areas, people are generally aware of the location of various health care delivery institutions, the kind of services they are supposed to render. Because of the more informed demand from people, the institutions tend to operate at a minimum level of efficiency.

For example, the APTRI study noted that, only 36.62% of the tribal patients were attending Government medical institutions, as against 69.66% among scheduled castes, 61.11% among backward classes and 92.85% among the other castes. The high caste migrants who are more influential, aware of the medical institutions and keep better contacts with officials are better utilising the institutions than the tribals. The tribal patients are attending in more number to the private practitioners than scheduled castes and other castes. It seems that the tribals are feeling shy and also fearing that they will not get a better deal at Government institutions. In the agency areas, it is common for tribals to be asking for health care services from Government employees belonging to other Departments. Particularly after setting up of the ITDA Projects, it has come to be perceived as a source of all services flowing from Government. So the tribals do naturally turn to the ITDAs for securing services from various sectors. Hence, there is greater need for the health care institutions in the agency areas to be more integrated with ITDAs.

2.11 What Can be Done About it?

As we have seen earlier many societies in the world have been concerned about retaining the opportunities provided by traditional medicine and in fitting it along with the opportunities provided by modern medicine to serve their health needs within the economic means available to them. Integration of traditional medicine in primary health care (PHC) has been recognised as an important theme for multilevel health systems research (Van der Geest[30] et al). Scholars, social

[30]Van der Geest S; Speckmann JD; Streefland PH; Primary health care in a multi level perspective: towards a research agenda, Soc-Sci-Med; 1990; 30(9) P 1025-34.

workers and people concerned about the health needs of remotely located populations have conceived of many alternatives. Different organisational strategies are being tried in different parts of the world for co-ordinated service delivery by the traditional or the alternative systems and the modern medical (allopathic) system. It would be appropriate to recapitulate and review the international and domestic experiences.

2.11.1 The International Experience:

Interactive programs between personnel from different systems of medicine have had positive results in many places. Such programs mainly consist of collaborative fora and training programs.

Christie reports a "dialogue group" between practitioners of alternative medicine and modern health practitioners, started in Norway in 1989. Foller[31] has reported about a project called AMETRA (Application of Traditional Medicine) in Peru. The aim of AMETRA is to give courses and stimulate co-operation between the historically oriented traditional medical practice and the "symptomatic" Western medicine. AMETRA endeavours to encourage use of safe and effective plant remedies from local resources to treat current ailments and diseases, and to integrate the use of vegetable drugs with commercial drugs. Coreil[32] has reported about the independent adoption of oral rehydration therapy on the part of traditional folk healers in Haiti. Traditional healers in north eastern Brazil were successfully trained in oral rehydration therapy for diarrhoea[33].

Bastien[34] has reported that CHWs in Oruro, Bolivia, have, successfully adapted their position to traditional medicine as practised in one Andean community. Project Concern Oruro and the Ministry of Rural Health Oruro attempted to adapt CHWs attributed their social life. 70 CHWs were trained in 3,1 week courses. The CHWs attributed their success to how well they adapted their work to Aymara and Quechua leadership styles. CHWs utilised Andean rituals, symbols, and traditional folklore in their training courses.

Hoff[35] has reported an interesting example of nurses and traditional healers joining hands. There are between 5000 and 8000 traditional healers in Swaziland. 85% of the population use their services. For years there was mistrust between nurses and traditional healers. The Health Education Centre and the Swanziland Traditional Healers Society began a pilot project. A 5 day exploratory workshop was organised for Traditional Health Society and health personnel in all major regions of Swaziland. The basic aim was co-operation to prevent diarrhoea, malnutrition, malaria and polio. 23 healers representing 4 major types - midwifes, herbalists, faith healers and spirit mediums were chosen to take part. 4 rural clinic nurses, a sanitarian, a public health nurse supervisor and 2 health educators also took part. Five regional workshops were also organised to encourage traditional healers and health personnel to cooperate in helping mothers control and prevent common children's disease. 2 months after the first regional workshop, a survey was done on the practices and beliefs of the people who had attended the workshop. 60% of the healers who had attended the workshop reported referring patients with diarrhoea and vomiting to a clinic. 7 of 8 clinic nurses confirmed that healers had referred cases. Healer began to use oral rehydration solution to treat dehydration.

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[35]Hoff-W: Maseko-DN; Nurses and traditional healers join hands. World Health Forum, 1986: 7(2):412-6.

Cross referral of patients between the modern and the traditional systems of medicine has been considered as an important means of bringing about convergence.

The traditional medicine men of Zimbabwe (N'anga) refer cases to other practitioners for either or both of two reasons[36]. Firstly failure of his own treatment after repeated visits and secondly the patients with an illness for which the practitioner is not specialised. Similar practices were also found in the among the traditional practitioners interviewed during the field visits to the tribal areas of AP. Such a practice provides the opportunity to train traditional healers about timely referral and conditions when they must refer cases for appropriate professional and institutional care.

Changes in medical education curriculum have also been tried in different parts of the world. China is the leader in this respect. The Chinese curriculum for modern medicine includes courses on the Chinese traditional medicine. Tazhib[37] has reported that the College of Health Sciences of the University of Sokota in northern Nigeria prescribes a 90 hour curriculum in traditional medicine. The course includes a survey of the major traditional medical systems and methods as well as a classification of Nigerian traditional medical practices in years 2. Methods of evaluating diagnostic and therapeutic tools, herbal, birth attendant, bone setting practices and traditional psychiatry are covered in years 3& 4. Supervised field visits to recognised practitioners are organised in years 5 & 6. Ajai[38], on the other hand views efforts at coexistence of traditional systems and modern medicine in Nigeria fraught with legal and constitutional problems.

2.11.2 The National Experience in India:

The Bangalore seminar recommended that all the department responsible for health development programmes and forest development in the tribal areas, specifically the Integrated Tribal Development Project areas, should be brought under the administrative control of an Integrated Tribal Development Agency (ITDA). This would result in more meaningful planning and implementation of programmes in an integrated fashion since a single agency, the ITDA would be responsible for the implementation of all programmes.

The seminar observed that the medical educationists, teachers and universities are being exhorted to educate the medical students to be partners with the community in primary health care, and to integrate traditional medicine with modern medicine, a small task force to bring together all the available scientific documentation on tribal medicine, traditional ayurvedic and other local mediciness, tribal health practices and health related behaviors into a concise book.

States with high proportion of population of tribals should incorporate in their administrative, health and family welfare training programs, a special course on tribal issues, their health and development needs, factors influencing these, and specific strategies to be utilized for health and development of the tribals. For this, the different departments as well as the training institutions should come together and involve the leading voluntary organisations, to design a standard content, training and reading materials including manuals, and case studies, and a training programme to train the teachers. Thus, a systematic programme of sensitising all administrators, health professionals and paramedical personnal is needed.

It is necessary to give the doctors and all paramedical staff working in tribal areas a general orientation in tribal life and culture, so that they are able to communicate with people on their own

[36]Arkovit M.S.; Manly M.; Specialisation and referral among the n'anga (traditional healer) of Zimbabwe: Tropical doctor, 1990 Jul; 20(3):109-10.

[37]Tazhib-B ; Daniel SO; Lancet 1986 jul. 26; 2(8500): 203-4.

[38]Ajai O, The integration of tradiotional medicine into the Nigerian health care delivery system: legal implications and complications, Med-Law: 1990; 9(1); P685-99.

wave length own wave length and to establish rapport. This is a prerequisites to the success of any health programme in the tribal areas. A physician, who does not try to understand the cultural and intellectual level of the people, does not develop a feel for cultural differences and proves to be a less successful practitioner. If scientific medicine is to be carried to tribal areas, it is necessary for the medical practitioners and public health workers to acquire adequate knowledge of the general concept of culture and social organisation of the tribal community.

The assistance of the Tribal Research & Training Centres available in all the States with significant tribal population, should be availed for the purpose. In fact, to begin with, all officers being posted to TSP areas can be imparted training at these institutions, and gradually all the other administrative and health and family welfare training institutions can implement the course on tribal issues after evolving a suitable design and content.

One of the challenging aspect of tribal way of life is that most of the tribal population live in small dispersed settlements, usually not more than 30 households per hamlet (as reported by workers from Bastar, Udaipur district and among Soligas of B R Hills) or even one house on a hillock (Vansda area of Gujurat and several others). This renders it difficult to achieve coverage even if the staff are posted on relaxed norms. Hence, keeping in view the need to provide health and development services to widely dispersed populations, it becomes a necessity to train village health workers and establish them as the link between the health services and the community. Further, the same community workers can be a link for the other programmes also. Thus, a major emphasis in the training of personnel (health or otherwise) should be on the skills to identity, train, supervise and manage health and development workers form each hamlet. Otherwise, it may will be humanly impossible for the health staff alone the run all the primary health care programmes on their own. The village workers can be trained to educate and organise the community for drinking water maintenance and sanitation, maternal and child care including immunisation, activities associated with malaria control, yaws control, VD control, TB control, Leprosy control and any other control programme to be implemented. The village health workers can also be provided with basic drugs, B-complex where deficiencies are common, and particularly folic acid tablets for routine distribution to known carries of sickle cell trait, vitamin-A supplementation wherever required, etc.

The essential need is to shift the emphasis of the Government and other health staff from attempting to do the tasks themselves, to, managing and utilising the community resources for achieving the final objectives of the programme.

Almas Ali[39] recommended operations research to develop and test alternative ways of health service delivery on an experimental basis in some selected ITDAs representing different ecosystems.

Regarding the manner of expansion of traditional (non allopathic) medicine the quick evaluation study[40] recommended that the non allopathic clinics/ doctors may be attached to the existing PHCs as at present. The argument that it will give rise to professional rivalries if the two systems are located at the same place is not correct because the two systems are capable of playing complementary role. There is no evidence regarding any significant professional rivalry between the doctors of non allopathic and allopathic systems. On the other hand, among allopathic doctors, there is more rivaly between the disciplines and among doctors of the same discipline even. The professional integrity of non allopathic doctors is not affected by the attachment to allopathic oriented PHCs as the system is only limited to clinical work any serious / urgent ailments are referred to allopathic doctors for treatment.

[39]Ali Almas, New perspectives in tribal health research, Adibasi, Bhubaneswar, Jan- March. 1986

[40]Ibid: Evaln. Report on PHCs with non allopathic clinic, AP Plg dept. 1985.

The only permanent solution to the problem of malnutrition in tribal areas would be to increase the intake of food and also make it more balanced. In consumption of vegetables and milk can help improve nutrition levels significantly. This can happen only it the tribals grow vegetables and domesticated milch animals. Thus the problem of nutrition can only find a solution through the efforts in horticulture and dairy farming. Promotion of nutrition gardens in tribal areas have given positive results in terms of tribals nutrition status[41].

3 ECONOMIC POTENTIAL OF HERBAL RESOURCES OF THE TRIBAL AREAS AND CONDITIONS FOR THEIR EXPLOITATION TO THE ADVANTAGE OF THE TRIBAL

Apart from the local use of herbs for common ailments there are three important economic potentialities of the herbal resources that are being collected or can be potentially collected by the tribals of AP. The tribal areas of AP consist of sub tropical rain forests. The flora of these forests is rich in many plants with medicinal properties. The three important economic potentiality are :

1. Herbal Remedies & Herb Based Pharmaceuticals
2. Intellectual Property Rights on Pharmaceutical and Chemical leads that the local flora may provide.

Supply of Natural and Plant Products Collected by the tribals for pharmaceutical and other manufacturing purpose.

3.1 Herbal Remedies & Herb Based Pharmaceuticals:

Herbal based remedies and pharmaceuticals are based on either the teachings of the traditional systems of medicine or on empirical observations about efficacy of the concerned herbal preparation. Full scientific details of the mechanisms of action etc. may not be known. Empirical observations about the action and efficacy of a preparation do play a significant role in the day to day practice of medicine. Examples of herbal based remedies that are widely prescribed both by ayurvedic and allopathic practitioners are the products made by the Himalaya Drug Co., Zandu Pharmaceuticals in India, Shaman Pharmaceuticals in the USA etc. The Chinese traditional medicine preparation of Zinseng is well known.

Sale of herbal remedies in the European and American market has been growing at a faster rate than that of the traditional pharmaceuticals (modern drugs). According to one estimate[42] the total value of imports of medicinal plants increased from $335 million in 1976 to $551 million in 1980. This is equivalent to an annual growth rate of 18%.

Thus sale of herbs as raw materials for herbal remedies has a lot of potential of fetching good income to the tribal collectors. It needs to be realised that real improvements to the financial realisation by the tribal collectors will occur only if the herbs collected by them are marketed as raw materials for mass produced herbal remedies, particularly in the international market. The prices offered by international manufacturers of herbal remedies are generally much higher than that available in the domestic market. On the order hand the international manufactures have access to the herb collectors on a world wide basis. Some times the manufactures may not even known that a particular herb is available from Andhra Pradesh. Apart from the business inputs of the herb marketing agency (GCC) the state needs to create a generally potentiating environment for creating

[41]Patil J.S. Institute of Rural Reconstruction. Bordi, Thane, Maharastra 401701

[42]Anonymous (1982) Markets for medicinal plants and their derivatives, Geneva: International Trade Centre; UNCTAD/GATT; 206 pp: cited by Husain ibid.

a demand for the herbs of Andhra Pradesh in the national and international market. Some such steps would be :

1. Ethnobotanical Research
2. Clinical Trials
3. Standard Specification of Herbs as Raw Materials.

Table-1
State Wise Abstract of NAPRALERT Articles from India

State	Nos.	%
ANDHRA PRADESH	571	6.38
ASSAM	71	0.79
BIHAR	36	0.4
GOA	39	0.44
GUJARAT	172	1.92
HARYANA	45	0.5
HIMACHAL PRADESH	54	0.6
JAMMU & KASHMIR	372	4.15
KARNATAKA	378	4.22
KERALA	146	1.63
MAHARASTRA	780	8.71
MADHYA PRADESH	487	5.44
ORISSA	29	0.32
PUNJAB	72	0.8
RAJASTHAN	344	3.84
TAMIL NADU	384	4.29
UTTAR PRADESH	2,636	29.44
UNION TERRITORIES	983	10.98
WEST BENGAL	1,218	13.6
OTHERS	138	1.54
ALL INDIA	8,955	100

3.1.1 Ethnobotanical Research:

Traditional systems of medicine, traditional practitioners, and folk tradition ascribe different medicinal properties to herbs and plants of the area. Traditional practitioners and folks in different geographical area may ascribe different medicinal properties to the same plant based on their experiences over the ages. Ethnobotanical research documents these claims and practices. Herbal remedy manufactures and their scientific wings generally look for ethnobotanical literature for sourcing of raw materials. Published ethnobotanical literature also gives them a sense of confidence on the claims about the herb. For some time chemical and pharmaceutical scientists tried the approach of randomly looking for useful chemical compounds and therapeutic ideas from plant sources by subjecting plant materials to mass scale chemical analysis. It is now realised that given the vastness of natures chemical resources in the diverse flora found in different parts of the World it is not economical to look for chemical activity and therapeutic ideas on a random basis. Instead scientists are now relying on ethnobotanical research to know about the known medicinal and therapeutic claims about plant materials. With this information scientists now subject a plant material to a selective line of chemical and pharmaceutical analysis. This improves the chances of discovery of therapeutically useful substances. Thus ethnobotanical research has three important implications for creating an environment suitable for exploitation of economic potential of the herbal resources.

1. Documentation of the claims of traditional practitioners and folk tradition about the medicinal properties of a herb or plant material.
2. Dissemination of information about the availability of a particular herb or plant material among herbal remedy manufacturers.
3. Essential prerequisite for the herb to be picked up by pharmaceutical research laboratories for chemical analysis. This has economic implications by way of royalties for intellectual property rights and as raw materials to modern pharmaceuticals, which is discussed latter.

Already a good deal of ethnobotanical research is being done in India and Andhra Pradesh. To make an assessment of the ethnobotanical research activities in the country the World data base on

natural products “NAPRALERT” was searched. NAPRALERT (Natural Products ALERT) is maintained by the Program for Collaborative Research in the Pharmaceutive Research in the Pharmaceutical Science, in the College of Pharmacy of the University of Illinois at Chicago. A city and state wise search of the number of research of the number of research articles on natural products from India was made. Table-1 shows an abstract of scientific articles on natural products from India. These are mostly about the chemicals identified from natural sources, mostly, plants in India. About 6.38% articles have been from Andhra Pradesh. City wise details of scientific articles on natural products from India are shown in Annexure-1 at page 35. Considering the richness of flora in the subtropical forest of AP this is not enough. More over this research on chemical compounds from natural sources has been possible despite the fact that we do not have a good system of readily making available ethnobotanical information on plants to scientists. A computerised ethnobiological data base with facilities of on-line access by The PCRPS in University of Illinois at Chicago have just developed the format for a ethnobiological database called the “MEDFLOR”. This is designed to be forward linked to the “NAPRALERT”. The PCRPS plans to let “MEDFLOR” be set up at different locations in the developing world for more effective reporting of ethnobiological information. Naturally entry of a plant materials traditionally known therapeutic properties into “MEDFLOR” will improve the chances of it being picked up by research institutions for further chemical and pharmaceutical analysis.

3.1.2 Clinical Trials:

Clinical trials of claims about the efficacy of particular herbs is an important factor for promoting use of the local herbs in herbal remedies. These trials require collaborative effort of ethnobotanists with medical professionals from both modern and traditional system of medicine. Collaborations with teams and professionals in important international academic and research institutions would help in dissemination of knowledge about the herb and its properties among a wide range of herbal remedy manufactures and intermediate dealers. Results of clinical trials published in respective professional journals could be disseminated effectively through proposed computerised ethnobiological data base “MEDFLOR” and the “NAPRALERT” combine. Both domestic and international funding will be required to promote more clinical trials. Domestic funding can be used to support local expenses of the program. International funding should be sought for exchange of scientists involved in the collaborative clinical trial projects. The Institute of Health Systems has established contact with a scientist in the Harvard Medical School and the School of Public Health, who specialises in such types of clinical trials. More detailed projects could be worked out after identifying GCCs priorities and the professionals.

3.1.3 Standard Specification of Herbs as Raw Materials:

One of the prerequisites of any international trade is standardisation of products, materials and processes. Only then a manufacturer located at a distant place will have confidence on the reliability and value of the raw material that he would like to import. This is also very much required for herbs. Standardisation of herbs should be done by setting up multi disciplinary teams consisting of ethnobotanists, chemical scientists, herb collectors, technical representatives from Ayurvedic pharmaceutical manufactures, herb storage personnel and others. Services of he Bureau of Indian Standards (BIS) can be utilised for guiding the process of standard development. Available standards from international sources should be obtained and adapted to the local needs. Where ever standards do not exit in the international market the GCC should either develop its own standard specification or ask a third independent agency to set up the standard.

3.2 Intellectual Property Rights on Pharmaceutical and Chemical Leads that the Local Flora may Provide:

The first idea on quite many modern therapeutic agents was provided by folk practices, plant and other biological materials collected from different parts of the world. So far the chemical and pharmaceutical leads provided by biological organisms (plants and animals both) found any where in the world were considered to be the common property of mankind and no particular intellectual rights were recognised. However world opinion is now changing on this issue. Despite the fact that certain very profitable drugs and therapeutics were developed from out of leads from biological organisms found in particular parts, coupled with the folk knowledge about the plant, it was observed, the local population continued to remain in a state of poverty. Many intellectuals, quite rightly, have considered this as unfair. World opinion is now in favour of recognising the intellectual rights of the local population over the potential benefit to a pharmaceutical company arising out of any chemical or therapeutic lead provided by a plant material traditionally found in their areas and about which the local population have accumulated a good deal of empirical information over the years. The empirical information and also prejudices are generally embodied in the folklore and practices of traditional medical practitioners.

The Rain Forest Alliance[43] is a New York based NGO (non governmental organisation) trying to argue and protect the intellectual property rights of the native populations over the contributions by the plant and organisms collected by them and supplied to a research laboratory towards development of a new drug. The drug need not be herb based. It is quite likely the drug is actually synthesised by the manufacturers instead of being extracted from the plants. If the drug was developed out of leads and ideas provided by the natural products collected and supplied by some people those people have an intellectual property right over the profits arising out of the discovery. The Rain Forest Alliance has been successful in convincing some pharmaceutical manufacturers and research houses to enter into such agreements at the state of procurement of herbal raw materials for research. They have developed some model agreements for this purpose. Local expertise needs to be developed in negotiating supply arrangements while protecting the intellectual property rights of the tribal collectors.

3.3 Supply of Natural and Plant Products Collected by the Tribals for Pharmaceutical and other Manufacturing Purposes:

Though the trend in pharmaceutical industry is to go for synthesised routes for manufacture of drugs on a large scale there would always be a few drugs which would require plant based raw materials till synthetic alternatives are found. The key to capturing this market for the benefit of the tribal collectors is to identify the chemical compounds available in the natural flora of the state and to match the same with the chemical compounds for which pharmaceutical manufactures have a demand. Some times presence or absence of a chemical in a material required for purposes other than that chemical is important. This situation arises when the presence of the contaminating chemical would affect the manufacturing process. A general understanding of the presence or absence of various chemical compounds in the plant material available in the state will improve the ability of GCC to look for markets and negotiate contracts. Annexure-2 at page 38 and Annexure-3 at page 39 show an abstract, from NAPRALERT, of the type of chemical compounds found in different plant materials from India and Andhra Pradesh respectively, on which research has been done. A

[43]The Rain Forest Alliance, 270 Lafayette St. Suite 512, New York. NY 10012, USA, Tel : (212) 941 1900. Fax: (212) 941 4986, Contact Ms Sarah Laird, Director, Periwinkle Project.

list of active constiuents with future potential in medicine, as identified by Husain is shown in Table-2. Annexure-6 at page 41 shows a list of important active constituents used in medicine. Annexure-4 and Annexure-5 show list of crude extracts and essential oils and terpenes used in medicine respectively. Annexure-7 shows the list of major medicinal plants entering global commerce.

Table - 2
List of Active constituents with Future Potential in Medicine

Active Constituents	Plant Raw Material	Pharmacological
1 Valeporiates	Valerina sp.	Sedative, tranwuilliser
2 Sylimarin	Sylibum marianum	Antihepatotoxic
3 Podiphyllotoxin	Podophyllum sp.	Anticancer
4 Gugul saponins	Commiphora mukul	Hypolipidaemic
5 Artemisinin	Artemisia annua	Antimalarial

From Hysain, Akhtar; Econimic Aspects of Medicinal Plants in O Akerele et al eds Conservation of Medicinal Plants, Cambridge University Press, 1991.

The general conditions favorable to marketing of natural and plant products of the state are:

3.3.1 Periodic Multi Disciplinary Discussions:

Multi disciplinary discussions among chemical and pharmaceutical scientists, ethnobotanists and herbs marketing personnel will help appreciate the strengths and weakness' of the herbal raw materials of the state in the light of international an national demand for such products. These discussions should lead to more concrete procurement and marketing strategies and also long term research agenda of the state. Periodic seminars and symposia would be possible fora for such discussions.

3.3.2 Biochemical Research:

Further research efforts need to be directed to increase the number of plant sources involved and also to do more sophisticated higher level chemical analysis. Apart from necessary laboratory facility promotion of such research would also require availability specialised data base like the NAPRALERT.

4 RECOMMENDATIONS

The recommendations are grouped under two broad categories corresponding to the two main terms of reference. These are :

1. Recommendations for improvement of health facilities in tribal areas from the perspective of traditional and herbal medicine.
2. Recommendations regarding creation of necessary environment for exploiting the economic potential of health and traditional medical resources of the tribal areas.

4.1 Recommendations for Improvement of Health Facilities in Tribal Areas from the Perspective of Traditional and Herbal Medicine:

The APTRI study revealed that 35% of those who could not afford the health care, could not do so because of locational disadvantages. Next to the tribals own poverty, this was the major cause for non use of available facilities. The tribal areas are sparsely populated and hilly. Distances are usually more. This calls for utmost care in selection of the locations for service delivery institutions. The central villages at central places have to be carefully selected on the basis of geography, physical distance, traditional routes of communication etc. Even now there are many PHCs without much of permanent accommodation. It would be ideal to review their location, before permanent accommodation. It would be ideal to review their location, before permanent

constructions fore close this option. It is suggested that the ITDAs take up a comprehensive review of locations of PHCs and sub centres and recommend changes if required. Senior Officers like the Project Officer, Sub Collector should be asked to personally study the area of operation and also visit the field to ascertain the peoples convenience. These proposals should be discussed in the ITDA general body to ensure that the views of peoples representatives are incorporated. Both on such an exercise the headquarters was well as jurisdiction of PHCs and sub centres should be redrawn. This exercise should be started quickly and completed at least within a year.

4.1.2 Promotion of Common Herbal Recipes (C.H.R.):

It is proposed that certain common and widely acceptable herbal recipes should be identified and promoted through the PHC network. The list should be finalised on the basis of consensus among clinicians from Ayurvedic and other Indian systems of medicine, modern medical system as well as ethnobotanists. An ad hoc list of CHR has been prepared and is shown in Annexure-8 at page 44. It is proposed that this list be further discussed by a multi disciplinary team and a consensus arrived at. Before the list is put up for such discussion some amount of background work needs to be done. These will be:

1. Bibliographic and literature search on the plants proposed to be included in the recipes and preparation of summaries dealing with available information on the chemical compounds in the plant, known therapeutic action etc.
2. Bibliographic and literature search on clinical trials on the recipes proposed for inclusion if any.

These information should be placed before the multi disciplinary workshop, so that an informed opinion can be formed about the desirability, safety etc., of the proposed CHR. The final CHR could be officially advocated through the PHC network, would form the basis of herbal resource curricula in the schools and colleges etc.

4.1.3 Area Referral Hospitals :

Referral services within the tribal area are almost non existent. At present the PHCs in tribal areas have to send cases requiring hospitalisation to district headquarters. The district headquarters are not only far off but are located in a cultural environment totally alien to the tribal. The APTRI study noted absence of referral services as one of the major reasons why the PHC set up who loosing its credibility. In order to bridge this gap, it is essential that 100 bedded secondary level area hospitals are set up in each ITDA headquarters. In most of these places there are already small hospitals with about 30 or less number of beds. So upgrading them to 100 bedded area hospitals will serve the purpose. It may be noted that the Secondary Level Hospitals Development Project[44] posed by the government of AP to the World Bank does seek to cover this gap. What is required is effective co-ordination between the Tribal Welfare department and the Health department in quicker implementation of these as soon as the project is sanctioned. The ITDAs can also take advance action in locating additional land for the expansion.

4.1.4 Tribal Health Training & Resource Centres :

It is proposed that a tribal health training and resource centre be established in the head quarters town of each ITDA. This centre should undertake various training programs these centres should be attached to the respective ITDAs. Apart form the APTRI these centres should undertake various training programs as detailed below.

[44] AP Vaidya Vidhana Parishad, Secondary Level Hospitals Development Project, 1990.

4.1.5 Orientation & Training Programs :

4.1.5.1 Tribal Orientation training (TOT) for Health Workers:

A health worker, who does not try to understand the cultural intellectual level of the people, does not develop a feel for cultural differences, proves to be a less successful practitioner or change agent. If scientific medicine is to be carried to tribal areas, it is necessary for the medical practitioners and public health workers to acquire adequate knowledge and form a general concept of culture and social organisation of the tribal community. Hence it is necessary to give the doctors and all paramedical staff working in tribal areas a general orientation in tribal life and culture, so that they are able to communicate with the people on their own wave length and to establish rapport. This is a prerequisite to the success of any health programme in tribal areas. It is proposed that a two week tribal orientation training (TOT) be made mandatory for service in tribal areas. Any health worker who is posted or recruited into tribal area for the first time should be required to undergo the TOT within first six months of his posting. The TOT should be organised by the APTRI either at Hyderabad or at its regional centres. The curriculum should broadly consist of :

1. General understanding of tribals world view
2. Cultural and social practices of tribals having relevance on their health
3. Nutrition related practices
4. Traditional practitioners and their relationship to people
5. Herbal resources of tribal areas and cost effective herbal recipes

The faculty should be drawn from APTRI, tribal area nutrition specialists from the NIN or the AP Agricultural University, medical colleges etc., ethnobotanists and herbal resource experts having knowledge of AP's tribal area flora, public health specialists & c. Completion of TOT should be a mandatory requirement for drawing of tribal area allowance.

4.1.5.2 Primary & Traditional Health Workshops:

Primary health care workers who draw most of their education and training from the modern medical system should be aware of the positive contribution made by traditional health workers in treating health problem, their cost effectiveness and their behavioural efficacy. A few widely accepted recipes based on the herbs and plant materials available in the tribal areas of the state have been identified. The details of these recipes, the purpose for which they can be used etc., are furnished in Annexure-8 at page 44. On the other hand the traditional health worker need to be aware of the proven and widely accepted practices by which the primary health worker seeks to tackle the important public health problems like diarrhoea, malaria etc. Experience with joint workshops consisting of traditional health workers and primary health workers has been quite favourable in many part of the world.

4.1.5.3 Traditional Birth Attendant (DAIS) Training & Support:

The tribals prefer home delivery to institutional delivery. As has already been referred, 80% of deliveries in tribal areas takes place at home. The cultural inhibitions in resorting to institutional medical care seems to be the maximum for child birth. Training of Dais in tribal areas assumes a greater significance in the above context. A study on training of Dais by NIHFW (1983) recommended that :

1. Dias kit should bee provided along with the training, and replenishment should be quick.

2. There must be enough pregnant women in the field practice area of the training institution for useful practical experience.
3. Periodic refresher training is very important.
4. Innovative dais training methods developed by voluntary agencies. (NGOs) at Pachod and Jamkhed have been very successful.

Hence a well organised Dias training and support programme is called for. Recognising the need to IFAD project[45] has proposed a newly designed training programme consisting of four sessions of 15 days each (total duration of 2 months). The programme would be held at the PHC and Sub centre level, supervised by the PHC Medical Officer and by the lady health supervisor. This will be in all probability adequate, in case of the old PHCs, where a labour room is already established. Many of the new PHCs do not, as yet, have a running labour room. Hence it would bee ideal if one of the sessions is spent in a community / Taluk hospital labour room, so that the trainee gets to experience of at least 10 to 15 deliveries. Those who complete this training should be registered by the ITDA as Traditional birth attendants and field practice area selected by her should also be taken note of. Though the traditional birth attendants will be charging the tribal family for her services, this may not be an adequate incentive / remuneration for her services. Hence ITDA should pay an honorarium of Rs.30/- per delivery, along with replacement of the dais kit. Payments should be made by the PO ITDA once in a month on the basis of certification by the Medical Officer of the PHC.

4.1.6 Herbal Resources and School Education:

4.1.6.1 Teachers Training on local Herbal Resource:

School teachers working in the tribal areas should be trained about the local herbal resources in the area of their posting. The training should enable them to identify common plants and herbs required for the common herbal recipes. They should be able to prepare the identified common herbal recipes. A set of such recipes have been proposed in Annexure-8. This could be used as a starting point. The common list of herbal recipes should however be revised once in at least 5 years to take into account results of research, feed back from the field etc.

4.1.6.2 Herbs Resource Curriculum for Schools :

One of the important objectives of education is to enable a child to be able to interpret his environment in the proper scientific perspective. The older generation of parents who are rooted in the forests and the local flora are usually capable of identifying various plants in their surrounding and also know to some extant about the medicinal properties of them. Providing for teaching of local herbal resources and common recipes will help the children better interpret and appreciate their environment. The common recipes will also enable them to tackle their day to day health problems in a very cost effective manner. Hence it is proposed that specific course material on local herbal resources be introduced in the schools in the tribal areas. Again the recipes proposed in Annexure-8 is recommended fro inclusion in the course.

4.1.7 Herbal and Traditional Medicine and Medical Education Curriculum:

[45]A.P. Tribal Development Project, Appraisal Report, Working Paper No 8, International Fund for Agricultural Development, Asia, 1990.

It is proposed that the AP University of Health Sciences consider to introduce suitable course material on comparative health systems in to the curriculum of all degree programs in all systems of medicine. For example the students in modern medicine should be taught about the basic premise and basic approaches of Ayurveda, Homeopathy etc. They could be taught about very widely recognised and herbal remedies based on local herbs and their utility in day to day practice. Similarly the students in Indian Systems of medicine should be taught about the basic approaches of modern medicine. They could be taught about the role and application of such widely accepted modern public health measures like immunisation. The Chinese system of medical education is based on a similar approach. All students of modern medicine in China are required to study the basics of Chinese traditional systems of medicine. As a result China has been able to achieve maximum convergence and very successful coexistence of both systems of medicine.

4.2 Recommendations Regarding Creation Necessary Environment for Exploiting the Economic Potential of Herbal and Traditional Medical Resources of the Tribal Areas:

These will consist of :

1. Fund of research in herbal and traditional medicine.
2. Ethnobotanical Units.
3. Adoption of appropriate contract document for supply of plant materials to pharmaceutical manufacturers, research institutions and intermediaries.
4. MEDFLOR-INDIA ethnobiological data base.
5. Forest management and medicinal plants.
6. Cultivation of medicinal plants.
7. Maintenance of botanical gardens and ethnobotanical studies by institutions of higher educational.
8. Co-ordination mechanism on medicinal plants.

4.2.1 Fund for Research in Herbal and Traditional Medicine:

Already some amount of research in various aspects of herbal and traditional medicine is going on in the state. For example the Government of India have a program of ethnobotanical documentation. Various national laboratories are doing research on issues which are of relevance to the exploitation of the economic potential of herbal and traditional medicine. We have already seen this through the statistics on research articles from AP and India on natural products, obtained from NAPRALERT and referred to earlier. However most of these efforts are independently arising out of the respective missions of the concerned institutions and the interests of the scientists working therein. As a result all aspects of the economic potential of herbal and traditional medicine do not get researched. Due to certain critical gaps in research the state has not been able to reap the full benefit out of the potential that the herbal resources of the tribal areas provide. It is suggested that the GCC set up a fund for promoting research on various aspects of herbal and traditional medicine with particular reference to the tribal areas. The main thrust of the proposed fund will be to finance crucial balancing research in various aspects of herbal and traditional medicine, with particular emphasis on contribution of such research towards exploitation of the economic potential of the states herbal resources. It is proposed that the fund should support research activities in the following areas:

1. Ethnobotanical research
2. Multi disciplinary clinical trial of herbal recipes

3. Intellectual property rights on chemical and therapeutic leads provided by the herbal and ethnobiological resources of the state.
4. Conduct of multi disciplinary workshops, seminars and symposia on economic aspects of herbal and traditional medicine.

Though most of the research work will need to be done through institutions which come under the purview of other departments the fund should be administered by either the GCC or the Tribal Welfare department. In case of the GCC the division looking after the procurement and marketing of herbal resources could provide secretarial support. In case of the Tribal Welfare department the APTRI could provide the necessary secretarial support. The fund should be administered by a research advisory body led by officers of GCC / TWD and should have members from other institutions / departments. The following compositions proposed.

Suggested Composition of the Advisory Committee to the Proposed GCC Fund for Research in Herbal and Traditional Medicine

Commissioner / Director Tribal Welfare	Chairperson
M.D. GCC	Member Secretary
Dir. Indian Medicine or his nominee	Member
Vice chancellor AP University of Health Sciences or his nominee	Member
Director APTRI	Alternate Member Secretary

Three scientists / health policy analysts in the field of herbal and traditional Members medicine. Method of nomination and the authority to nominate may be decided by the GCC and Department of Tribal Welfare.

The fund should consist:

1. A certain cess on the herbal and minor forest sales of the GCC. It is proposed that 1% of the sale proceeds from minor forest produces and herbal products of the GCC be credited towards the research fund.
2. Allocation to it made by the state government and central government by way of grants in aid etc.

4.2.2 Ethnobotanical Units:

It is proposed that an ethnobotanical unit be set up in each ITDA. The unit should have least one ethnobotanist, and one Ayurvedic practitioner, apart from other supporting staff. It would be convenient of tribal patients as well as herbal collectors, to located the ethnobotanical unit within the premises of area referral hospitals. This, it is hoped, will also increase the scope for co-ordination between the modern medical set up and the herbal / traditional system. The functions of this unit will be:

1. Identification and documentation of ethnobotanical information, traditional recipes and claims.
2. Identification of herbs and quality control support to herbs procurement by the GCC.
3. Training of herbs collectors in identification of herbs required by GCC, selection and sourcing of herbs to conform to quality control requirement of industry.
4. Teachers training and supervision of herbal resource curriculum in the schools in TSP areas.
5. Popularisation of cost effective herbal recipes.
6. To act as centres for clinical trial of herbal remedies in collaboration with the modern medical practitioners of the area referral hospital.

4.2.3 Adoption of Appropriate Contract Document for Supply of Plant Materials to Pharmaceutical Manufacturers, Research Institutions and Intermediaries:

The Rain Forest Alliance of New York have developed a model form of contract between collectors and suppliers of natural products from developing countries and pharmaceutical manufacturers, researchers or their intermediaries. These drafts are developed to protect the intellectual property rights of the local population whose flora and ethnobiological knowledge provides the lead to the pharmaceutical researchers. It is suggested that GCC consider to adopt these after suitable modification to take care of its specific needs.

4.2.4 Medflor-India Ethnobiological Database:

Continuing research into various aspects of herbal and traditional medicine is essential for exploiting their productivity. Research will lead to dissemination of information about herbal medicines to all medical and allied professionals in a manner appropriate for learning. This will facilitate co-ordianted provision of herbal / traditional medical service along with modern medical and health service. From the economic point of view marketing of herbal resources will provide opportunities for the tribal collectors to improve their income. The demand for herbs will naturally depend on their contribution to drug development as well as dissemination of information about their availability in AP or India. Ethnobiological knowledge is an important input in the search for new drugs. As Beecher and Gylenhall[46] have observed an in depth search for relevant facts for drug development is a long and tedious task that is almost inevitably incomplete. Even a complete library search results in a set of more or less isolated facts which must be further processed by the investigator before meaningful analysis. Researchers are increasingly turning to source type of computerised data bases that provides retrieval of more specific and detailed information than is usually available from bibliographic data bases. The PCRPS of the College of Pharmacy at UIC has been engaging itself in setting up and maintenance of such a data base. It is maintaining a “source” type data base on natural products called the NAPRALERT (for NAtural Products ALERT). This data base maintains information of plant type, class of chemical compounds identified from the respective plants, and major pharmaceutical activities / specific pharmaceutical activities. NAPRALERT is accessed by major pharmaceutical research laboratories as well as industries making herbal based drugs. Abstract of NAPRALERT information on AP and India has already been provided earlier.

PCRPS in the College of Pharmacy at the UIC is now planning to expand the scope of NAPRALERT by encouraging setting up of a network of ethnobiological databases in different parts of the world. This new data base has been named by them as MEDFLOR. This data base will gather and fine mainly three types of information.

1. Botanical coding of plants with medicinal properties
2. Usage information
3. Usage descriptions

MEDFLOR is designed to be compatibel with NAPRALERT. It is proposed that MEDFLOR be set up at Hyderabad. It should start recording ethnobiological information for AP. Gradually it would expand to cover information from all over the country. In setting up this data base will mean the medicinal plants resource information for AP are made available on an international basis to drug developers and drug manufacturers. This, it is hoped will facilitate of herbal produce

[46]Beecher C.W.W.; Gyllenhall C. MEDFLOR: An Ethnobiological Database, University of Illinois at Chicago, College of Pharmacy for Collaborative Research in the Pharmaceutical Sciences, Chicago, IL6-612. Unpublished artide, Personal Communications.

from the tribal areas. It should however be noted that this data base will make general facilitatory contribution.

The Institute of Health Systems is negotiating with the PCRPS in College of Pharmacy at UIC about the modalities of setting up of MEDFLOR at Hyderabad. The resource requirement and detailed project proposal for this will be worked out separately.

4.2.5 Forest Management and Medicinal Plants:

Wild flora are continuing to be the primary source of medicinal plants. Forest management practices have been traditionary oriented towards wood and timbre. The emphasis is now changing towards non wood forest produce. It is suggested that the forest department initiate specific steps to o draw up appropriate forest management practices which will protect and forest the medicinal plant resources of the states forests.

4.2.6 Cultivation of Medicinal Plants and Agronomic Research:

Though at present the main source of medicinal flora is the forest, once a herb assumes quantitative and financial significance in international trade some of the constraints and disadvantages of collection vis a vis cultivation would become evident. Advantages of cultivation over collection of medicinal plants are shown in Table-3. Thus sooner or later suppliers and international traders of herbs will tend to favour procurement of cultivated plants, particularly in case of mass consumed herbs. Hence it is imperative that GCC and the state government anticipate this possibility and prepare for it.

One important input towards cultivation of medicinal plants will be agronomic research. Agronomic research on medicinal plants will focus on genetic improvement to obtain plants rich in the required active ingredient, cultivation, post harvest technology for processing and storage and quality control. The AP Agricultural University should put in place a program of research in this area.

4.2.7 Botanical Gardens and Ethnobotanical Studies by Institutions of Higher Education:

Any effort at substantial realisation of the states medicinal plant resources would not succeed unless the state builds up the required professional, scientific and intellectual capability for the same. Young science graduates in the botany track should learn about the potentialities of their local flora. Departments of botany in Universities and degree colleges should maintain botanical gardens. Fortunately India has relatively more number of botanical gardens[47] than other developing countries[48]. It is reported that the Tropical Botanical Garden and Research Institute, Trivandrum has established a gene pool of medicinal plants and have raised about 650 species of medicinal plants. Such botanical gardens can provide expertise to colleges and universities in the state for setting up and maintenance of botanical gardens. The role of proposed botanical gardens needs to be appreciated. Traditionally the botanical gardens have been considered as facilities for education and development of skill. Apart from this the proposed gardens should take up activities like conservation of endangered species, experimental production of herbs and plant material. Each

[47]Those notabe for medicinal plants are: Allahabad Experimental Garden: Indian Botanical Garden, Howrah; Experimental Botanical Garden, Poona; University Botanical Garden, Surat; Tropical Botanical Garden and Research Institute, Trivandrum; National Orchidarium & Experimental Garden, Yercaud.

[48]Total number of botanical gardens in the world is about 1400. Of them 230 are in developing countrries. India has 36 of these.

garden should emphasise the local flora. All the gardens should be networked to share information about each and to co-ordinate so that each can diversify in certain area and there by complement efforts of others.

The department of higher education should have special programs to fund and monitor maintenance to the botanical gardens.

4.2.8 Co-Ordinating Mechanism on Medicinal Plants:

As would have been clear by now, simultaneous efforts in different sectors are required to realise the full economic potential of the herbal resources of the state. The institutions to be involved and the programs necessary for this purpose would fall within the purview of many different ministries of the state government. Co-ordination among the ministries and institutions will naturally be required to retain the focus on the ultimate objective. It is proposed that a co-ordination mechanism on medicinal plants be set up in the government. This mechanism should involve departments and institutions required for implementation of medicinal plants initiative. The following department / institutions are suggested for inclusion in the co-ordination mechanism.

1. Ministry of Health Medical and Family Welfare including Director Indian systems of Medicine, Director Drug Control Administration, and the A.P. University of Health Sciences.
2. Ministry of Social (Tribal) Welfare including Commissioner / Director of Tribal Welfare, Girijan Co-operative Corporation and the AP Tribal Research Institute.
3. Ministry of Environment, Energy and Forests including Chief Conservator of Forests.
4. Ministry of Agriculture including the AP Agricultural University.
5. Ministry of Higher Education and the Ministry of School Education.
6. Ministry of Industry and Commerce.

The co-ordination mechanism should should consist of ministerial level and secretariat level committees.

In fact the series of regional seminars on medicinal plants, in 1986, sponsored by the Government of India Ministry of Health and Family Welfare had suggested setting up of co-ordinating cells on medicinal plants in health ministries[49]**.** If A.P has to take a lead in marketing of its herbal resources then the state will have to bestow commensurate policy level attention and invest required resources.

[49]Alok S.K; Medicinal plants in Indai ; Approaches to Exploitation and Conservation, in O. Akerele et al ads Conservation of medicinal plants, Cambridge University Press, 1991.

ANNEXURE - I

NAPRALERT ARTICLES FROM INDIA
GROUPED BY STATE AND CITY

STATE ABSTRACT

State	Nos.
AP	571
ASSAM	71
BIHAR	36
GOA	39
GUJARAT	172
HARYANA	45
HP	54
J&K	372
KARNATAKA	378
KERALA	146
MAHARASTRA	780
MANIPUR	1
MEGHALAYA	9
MP	487
ORISSA	29
PUNJAB	72
RAJASTHAN	344
SIKKIM	1
TAMIL NAIDU	384
TRIPURA	10
U.P	2,634
UT	984
WEST BENGAL	1,218
ALL INDIA	8,955

CITY WISE ABSTRACT

STATE	CITY	Nos.
		126
	CHERUTHURUTHY	1
AP	HYDERABAD	168
AP	WARANGAL	35
AP	KAKINADA	1
AP	KURNOOL	12
AP	MADANAPALLE	2
AP	NAGAR	4
AP	NAGARJUNA NAGAR	32
AP	NAHARLAGUN	1
AP	NAHARLGUN	1
AP	ANAKAPALLE	1
AP	NUZVID	1
AP	PATANCERU	1
AP	ANANTAPUR	1
AP	RAJAHMUNDRY	6
AP	RAJENDRANAGAR	1
AP	CUDDAPAH	2
AP	SECUNDERABAD	2
AP	TIRUPATI	51
AP	GUNTUR	9
AP	VIJAYAWADA	7
AP	VISHAKHAPATNAM	23
ASSAM	CINNAMARE	1
ASSAM	DIBRUGARH	2
ASSAM	GAUHATI	10
ASSAM	JORHAT	56
ASSAM	TEZPUR	2
BIHAR	BHAGALPUR	15
BIHAR	BODH-GAYA	2
BIHAR	DARBHANGA	1
BIHAR	JAMSHEDPUR	1
BIHAR	PATNA	8
BIHAR	RANCHI	8
GOA	MARGO	1
GOA	PANAJI	36
GOA	PANJIM	2
GUJARAT	AHMEDABAD	64
GUJARAT	ANAND	8
GUJARAT	BHAVNAGAR	7
GUJARAT	JAMNAGAR	10
GUJARAT	JOBNER	1
GUJARAT	JUNAGARH	1
GUJARAT	MEGHANINGR	1
GUJURAT	NANDESARI	3
GUJURAT	NAUSURI	1
GUJURAT	RAJKOT	3
GUJURAT	VADODARA	63
GUJURAT	VALLABH VIDYANAGAR	5
GUJURAT	BASSI	1
GUJURAT	VILLABH VIDYANAGAR	2
HARYANA	ROHTAK	9
HARYANA	SIRSA	1
HARYANA	YAMUNANAGAR	1
HARYANA	HISSAR	20

HARYANA	KAITHAL	2
HARYANA	KARNAL	2
HARYANA	KURUKSHETRA	10
HP	DACHGHAT SOLAN	1
HP	JOGINDERNAGAR	1
HP	KANGRA VALLEY	1
HP	PALAMPUR	13
HP	PARWANU	1
HP	SIMLA	35
HP	SOLAN	2
J&K	BONERA	1
J&K	DORU	1
J&K	JAMMU	61
J&K	JAMMUTAWI	306
J&K	KASHWIR	2
J&K	UDHAMPUR	1
KARNATAKA	BANGALORE	157
KARNATAKA	BELGAUM	15
KARNATAKA	DHARWAD	1
KARNATAKA	DHARWAR	35
KARNATAKA	GULBARGA	4
KARNATAKA	HOSPET	1
KARNATAKA	MANIPAL	55
KARNATAKA	MYSORE	107
KARNATAKA	VITTAL	3
KERALA	PALAI	2
KERALA	CALICU	1
KERALA	COCHIN	4
KERALA	ERNAKULAM	1
KERALA	KOLENCHERY	2
KERALA	KOOTHATHUKULAM	1
KERALA	KOTTAYAM	3
KERALA	MANGALORE	2
KERALA	PATTAMBI	1
KERALA	TRICHUR	22
KERALA	TRIVANDRUM	10
KERALA	VELLANIKKARA	2
KERALA	VELLAYANI	1
MAHARASTRA	AURANGABAD	6
MAHARASTRA	BOMBAY	49
MAHARASTRA	DAPOLI	1
MAHARASTRA	KOLHAPUR	7
MAHARASTRA	NAGPUR	25
MAHARASTRA	NANDED	4
MAHARASTRA	PARBHANI	2
MAHARASTRA	PUNE	23
MAHARASTRA	RAHURI	1
MAHARASTRA	SOLAPU	2
MAHARASTRA	THANE	2
MAHARASTRA	TROMBA	2
MANIPUR	IMPHAL	1
MEGHALAYA	SHILLONG	9
MP	BILASPUR	4
MP	RATLAM	2
MP	JABALPUR	18
MP	PITHORAGARH	1
MP	BHOPAL	38
MP	CHHINDWARA	
MP	GWALIOR	54
MP	HOSHANGABAD	1
MP	INDORE	64
MP	MHOW	4
MP	NEEMUCH	1
MP	RAIPUR	12
MP	REWA	5
MP	SAGAR	24
MP	UJJAIN	34
ORISSA	BHUBANESWAR	19
ORISSA	BURLA	3
ORISSA	CUTTACK	2
ORISSA	CUTTUCK	2
ORISSA	PADAMPUR	1
ORISSA	BERHAMPUR	2
PUNJAB	AMRITSAR	8
PUNJAB	KAPURTHALA	2
PUNJAB	LYALLPUR	1
PUNJAB	PATIALA	6
PUNJAB	LUDHIANA	55
RAJASTHAN	AJMER	2
RAJASTHAN	BIKANER	15
RAJASTHAN	JAIPUR	257
RAJASTHAN	JODHPUR	29
RAJASTHAN	PILANI	21
RAJASTHAN	UDAIPUR	18
RAJASTHAN	BAKANER	1
RAJASTHAN	NAWALGARH	1
SIKIM	GANGTOK	1

TAMILNADU	VELLORE	13
TAMILNADU	ARUMBAKKAM	1
TAMILNADU	COIMBATORE	13
TAMILNADU	KASARAGOD	1
TAMILNADU	MADRAS	253
TAMILNADU	MADURAI	34
TAMILNADU	PARANGIPETTAI	6
TAMILNADU	POONDI	1
TAMILNADU	TAMBARAM	1
TAMILNADU	THANJAVUR	12
TAMILNADU	TIRUCHIRAPALLI	39
TAMILNADU	TIRUNELVELI	1
TAMILNADU	UDHAGAMANDALAM	1
TAMILNADU	PONNERI	1
TAMILNADU	KODAIKANAL	2
TAMILNADU	ANNAMALAI NAGAR	4
TRIPURA	AGARTALA	10
U.P.		
UP	MUZAFFARPUR	2
UP	HARDWAR	4
UP	SRINAGAR-GARHWAL	106
UP	PANTNAGAR	30
UP	GURUKULKANGRI	1
UP	PADRAUNA	1
UP	GYANPUR	2
UP	ROORKEE	20
UP	GORAKPUR	68
UP	SHIKOHABAD	1
UP	JHANSI	30
UP	GHAZIABAD	4
UP	ALLAHABAD	258
UP	SULTANPUR	1
UP	MODINAGAR	1
UP	MEERUT	14
UP	AGRA	40
UP	MORADABAD	1
UP	ALIGARAH	31
UP	DEORIA	1
UP	FAIZABAD	1
UP	VARANASI	44
UP	RANIKHET	7
UP	BARAUT	6
UP	BALRAMPUR	2
UP	ORAI	7
UP	BAREILLY	6
UP	RAMPUR	27
UP	IZATNAGAR	24
UP	MUZAFFARNAGAR	4
UP	NAJIBABAD	1
UP	NAINITAL	57
UP	DEHRADUN	39
UP	LUCKNOW	1,001
UP	MATHURA	4
UP	CHAUBATTIA	1
UP	HASTINAPUR	3
UP	HALDWANI	7
UP	KANPUR	77
UP	GARUR-BAIJNATH	1
UP	GARHWAL	4
UT	CHANDIGARH	22
UT	PONDICHERRY	11
UT	NEWDELHI	38
UT	PORTBLAIR	1
UT	DELHI	26
WESTBENGAL	BURDWAN	35
WESTBENGAL	MUNGPOO	1
WESTBENGAL	HOWRAH	6
WESTBENGAL	CULCUTTA	1,015
WESTBENGAL	PIN	1
WESTBENGAL	ITACHUNA	2
WESTBENGAL	KALYANI	67
WESTBENGAL	BANKURA	1
WESTBENGAL	KURSEONG	1
WESTBENGAL	SILIGURI	1
WESTBENGAL	SEROMPORE	1
WESTBENGAL	BARRACKPORE	1
WESTBENGAL	DARJEELING	22
WESTBENGAL	RAJARAMMOHUNPUR	3
WESTBENGAL	HOOGHLY	4
WESTBENGAL		1
WESTBENGAL	COOCHBEHAR	1
WESTBENGAL	SANTINIKETAN	43
WESTBENGAL	MOHANPUR	2
WESTBENGAL	TUNG	1
WESTBENGAL	NAIHATI	2
WESTBENGAL	NADIA	7

ANNEVURE-2

NAPRALET COMPOUNDS FROM INDIA ORDERED BY COMPOUND CLASS

CD	COMPOUND CLASS	NOS

1 STRUCTUREUNDETERMINED55
11 MISCULLANEOUS 51
12 ALKANE 251
13 ALKENE 43
15 ALKENYNE 17
16 LIPID 310
17 CARBOHYDRATE 226
18 PROTEID 250
20 FLAVONOID 1,644
21 POLYCYCLIC 65
22 OXYENHETEROCYCLE 74
23 QUINOID 310
24 BENZENOID 330
26 SULFURCOMPOUND 55
27 ALICYCLIC 18
29NON-ALKALOIDN-HETEROCYCLE20
30 ALKALOIDSABSENT 1
30 ALKALOIDSPRESENT 1
30 ALKALOIDS(INDOLE)ABSENT 1
30 ALKALOIDS(INDOLE)PERSENT 1
30 ANTHOCYANIDINSABESENT 1
30 ANTHOCYANIDINSPRESENT 1
30 CARDENOLIDES/BUFADIENOLIDESP RESENT 1
30 CAROTENESPRESENT 1
30 CATECHOLSPRESENT 1
30 COUMARINSPRESENT 1
30 ESSENTIALOILSABSENT 1
30 ESSENTIALOILSPRESENT 1
30 FLAVONOIDSABSENT 130
FLAVONOIDSPRESENT 1
30 FLAVONOLSABSENT 1
30 FLAVONOLSPRESENT 1
30 GLYCOFLAVONESPRESENT 1
30 GLYCOSIDES(UNSPECIFIEDTYPE) ABSENT
30 GLYCOSIDES(UNSPECIFIEDTYPE) PRESENT 1
30 HYDROCYANICACIDABSENT 1
30 HYDROCYANICACIDPRESENT 1
30 IRIDOIDSPRESENT 1
30 LEUCOANTHOCYANINSABSENT 1
30 LEUCOANTHOCYANINSPRESENT 1
30 MUCILAGEPRESENT 1
30 PHENOLICACIDSPRESENT 1
30 PHENOLSPRESENT 1
30 QUINONESABSENT 1
30 QUINONESPRESENT 1
30 SAPONINS(FOAMTEST)PRESENT 1
30 SAPONINS(UNSPECIFIEDTYPEORHE MOLY 1
30 STEROIDALSAPONINSPRESENT 1
30 STEROLSABSENT 1
30 STROLSAND/ORTRITERPENESABS ENT 1
30 STEROLSAND/ORTRITERPENESPRESENT 1
30 STEROLSPRESENT 1
30 SUGARSABSENT 1
30 SUGARSPRESENT 1
30 TANNINS(FERRICCHLORIDETEST) ABSENT 1
30 TANNINS(FERRICCHLORIDETEST) PRESENT 1
30 TANNINS(GELATINSALT-BLOCKTES T)AB
30 TANNINS(GELATINSALT-BLOCKTES T)PR 1
30TANNINS(HIDETEST)ABSENT 1
30TANNINS(HIDETEST)PRESENT 2
30XANTHONESPRESENT 1
31LIGNAN 338
32COUMARIN 453
33XANTHONE 186
34 MISCLACTONE 64
35 VITAMIN 16
36 CHROMONE 49
40 MONOTERPENE 343
41 SESQUITERPENE 640
42 DITERPENE 341
43 SESTERTERPENE 7
44 TRITERPENE 1,122
45 STEROID 411
46 SAPOGENIN 394
47 CARDENOLIDE 69
48 CAROTENOID 42
49 POLYPRENOID 4
50 ALKALOID-MISC 102
51 ALKALOID 36
52 ALKALOID 9
53 TROPANEALKALOID 15
54 PYRROLIZIDINEALKALOID 98

55	INDOLIZIDINEALKALOID	61
56	QUINOLIZIDINEALKALOID	9
57	QUINOLINEALKALOID	72
58	ISOQUINOLINEALKALOID	472
59	INDOLEALKALOID	302
60	ALKALOID	23
61	ALKALOID	49
62	ALKALOID	1
63	ALKALOID	20
64	MONOTERPENEALKALOID	6
65	SESQUITERPENEALKALOID	1
66	DITERPENEALKALOID	5
69	STEROIDALKALOID	65
70	PEPTIDEALKALOID	16
74	ALKALOID	7
75	LACTAM	3
96	ESSENTIALOIL	49
96	INORGANIC	2
97	INORGANIC	31
98	ANTIBIOTIC(STRUCTUREUNKNOWN)	19

ANNEXURE-3

NAPRALERT COMPOUNDS FROM ANDHRA PRADESH ORDERED BY COMPOUND CLASS

CD	COMPOUND CLASS	NOS
1	STRUCTUREUNDETERMINED	2
11	MISCELLANEOUS	1
12	ALKANE	13
13	ALKENE	1
16	LIPID	21
17	CARNPJUDRATE	23
18	PROTEID	21
20	FLAVONOID	261
21	POLYCYCLIC	10
22	OXYGENHETEROCYCLE	14
23	QUINOID	107
24	BENZENOID	40
26	SULFURCOMPOUND	3
30	ALKALOIDS ABSENT	1
30	ALKALOIDS PRESENT	1
30	ALKALOIDS(INDOLE) ABSENT	1
30	ANKALOIDS(INDOLE) PRESENT	1
30	ANTHOCYANIDINS ABSENT	1
30	ANTHOCYANIDINS PRESENT	1
30	CATECHOLS PRESENT	1
30	FLAVONOLS ABSENT	1
30	FLAVONOLS PRESENT	1
30	HYDROCYANICACID ABSENT	1
30	HYDROCYANICACID PRESENT	1
30	LEUCOANTHOCYANINS ABSENT	1
30	LEUCOANTHOCYANINS PRESENT	1
30	PHENOLS PRESENT	1
30	QUINONESABSENT	1
30	QUINONESPRESENT	1
30	SAPONINS	1
30	STEROLS ABSENT	1
30	STEROLS PRESENT	1
30	STEROLSPRESENT	1
30	TANNINS ABSENT	1
30	TANNINS PRESENT	1
31	LIGNAN	99
32	COUMARIN	21
33	XANTHONE	4
34	MISCLACTONE	4
35	VITAMIN	5
36	CHROMONE	10
40	MONOTERPENE	38
41	SESQUITERPENE	20
42	DITERPENE	57
43	SESTERTERPENE	4
44	TRITERPENE	157
45	STEROID	68
46	SAPOGENIN	1
47	CARDENOLIDE	21
48	CAROTENOID	3
49	POLYPRENOID `	1
50	ALKALOID-MISC	2
51	ALKALOID	1
56	QUINOLIZIDINE ALKALOID	2
57	QUINOLINE ALKALOID	7
58	ISOQUINOLINE ALKALOID	20
59	INDOLE ALKALOID	13
60	ALKALOID	7
69	STEROID ALKALOID	4
96	INORGANIC	1
97	INORGANIC	2

UNSPECIFIEDTYPEORHEMOLYAND/OR TRITERPENES
FERRICCHLORIDETEST
FERRICCHLORIDETEST

ANNEXURE-4

Plants Used as Crude Extracts in Medicine[1]

1	Belladonna	Atroapa belladonna
2	Ipecac	Cephalis ipecacuanha
3	Opium	Papaver somniferum
4	Henbane	Hyoscyamus niger
5	Stramonium	Datura stramonium
6	Cascara sagrada	Rhamnus purshianus
7	Liquorice	Glycrrhiza glabra
8	Rhubarb	Rheum officinale, R. Palamatum
9	Valerian	Valeriana wallichii
10	Podophyllum	Podophyllum peltatum, P. emodi
11	Capsicum oleoresin	Capsicum annuum
12	Digitalis	Digitals purpura
13	Aloe	Aloe sp.

[1] From Husain, Akhtar; Economic Aspects of Medicinal Plants in O. Akerele et at eds Conservation of Medicinal Plants, Cambridge University Press, 1991.

ANNEXURE-5

Important Essential Oils and Terpenes Used in Medicine[1]

1	Japanese mint oil	Mentha arvensis
2	Peppermint oil	Mentha piperita
3	Educalyptus oil	Eucalyptus globulus
4	Anised oil	Pimpinella anisum
5	Clove oil	Eugenia caryophyllata
6	Cinnamon leaf oil	Cinnamomum Zeylanicum
7	Lemongrass oil	Cymbopogon Flexuosus
8	Comphor	Cinnamomum Camphora

[1] From Husain, Akhtar; Economic Aspects of Medicinal Plants in O. Akerele et at eds Conservation of Medicinal Plants, Cambridge University Press, 1991.

ANNEXURE-6

IMPORTANT ACTIVE CONSTITUENTS USED IN MEDICINE[1]

Active Constituent	Plant Raw Material	Pharmacological Activity
1 Steroidal hormones	Dioscorea sp., Agave sp., Solanum sp	Anti-inflamatory.antiarhritic, Hormonal
2 Morphine, codeine, papaverine	Papaver somniferum	Sedative, antitussive
3 Quinine, Wuinidine	Cinchona sp.	Antimalarial, antiarhythmic
4 Hyoscyamine, Hyoscine, Atropine	Datura sp., Hyoscyamus muticus, Duboisia sp.	Parasympatholytic
5 Digoxin, lanatosides	Digitalis lanata	Cardiotonic
6 Reserpine, Rescinamine, Deserpidine	Rauvolfia serpentina, R. canescens, R. vomitoria	Vasodilator
7 Ajmalicine	Catharanthus roseus	Vasodilator
8 Vincristine, Vinblastine	C. roseus	Anticancer
9 Caffeine	Camelia sinensis	CNS stimulant
10 Cocaine	Erythroxylum coca	Anaesthetic
11 Ephedrine, Pseudo ephedrine	Ephedra sp.	Sympathomimetic
12 Pilocarpine	Pilocarpus jaborandi	Parasympathomimetic
13 Emetine	Cephaelis ipecacuanha, C. acuminate	Antiamoebic
14 Ergometrine, Ergotamine, Ergotoxine	Claviceps purpurea	Oxytocic, vasoconstrictor, vasodilator
15 Psyllium mucilage	Plantago ovata	Laxative
16 Vincamine	Vinca minor, Vocanqa africana	Vasodilator
17 Glycyrrhetic acid	Glycyrrhyzia glabra	Antiinflamatory
18 Sennoside	Cassia angustifolia, C. acutifolia	Laxative
19 Berberine	Berberis sp.	Antidiarhoeal

[1] From Husain, Akhtar; Economic Aspects of Medicinal Plants in O. Akerele et at eds Conservation of Medicinal Plants, Cambridge University Press, 1991.

ANNEXURE-7

MAJOR MEDICINAL PLANTS IN GLOBAL COMMERCE[1]

Plant Name	Used as Source of	Country of Production or Collection
Acornus calamus	Crude drug, essential oil	India (Cultivated)
Agave sisalana	Hecogenin	East Africa, Brazil
Aloe ferox	Dried leaf extract	South Africa (probably cultivated)
Aloe vera	Fresh leaf juice	USA(Cultivated)
Ammi majus	Khellin	Asia & Mediterranean (Cultivated)
Ammi visnaga	Xanthotoxin	Asia & Mediterranean (Cultivated)
Anthemis nobilis	Crude drug	Asia & Mediterranean (Cultivated)
Atropa acuminata	Crude drug	India (Cultivated)
Atropa belladonna	Atropine, total alkaloids	Central and southern Europe, cultivated in USA, UK, Eastern Europe, India, China
Berberis Vulgaris	Berberin & Crude drug	Europe, Asia
Carica papaya	Papin, Chymopapain	Cultivated in Sri Lanka, Zaire, Uganda, Mozambique, Tanzania, South Africa.India

Cassia acutifolia	Crude drug, sennosides	Cultivated in India
Cassia senna (=C. angustifolia)	Crude drug, sennosides	Cultivated in Egypt
Catharanthus roseus	Vinblastin, vincristine, ajmalicine	Pantropical, cultivated in USA, India and other countries
Cephaelis acuminate	Crude drug	Nicaragua, Colombia, Costa Rica, Panama
Cephaelis ipecacuanha	Crude drug	Brazil
Cinchona calisaya	Quinine, quinidine, cinchonine, cinchonidine, total alkaloids	Cultivated in Indonesia, Zarie, Tanzania, Burundi, India, Kenya, Guatemala, Peru, Ecuador, Bolivia, Rwanda, Sri Lanka, Colombia, Costa Rica
Cinchona ledgeriana	As above	As above
Cinchonal officinalis	As above	As above
Cinchona pubescens	As above	As above
Datura metel	Atropine, scopolamine, total alkaloids	Cultivated in Asia
Datura stramonium	As above	Cultivated in southern Europe and Asia
Digitalis lanata	Lanatoside A, purpurea glycoside A, digitoxin, digoxin, acety1 digitoxin	As above
Digitalis pupurea	Lanatoside A,B,C (converted also to acetu1 digitoxin and digitoxin)	Cultivated in India and temperate zones
Dioscorea composita	Diosgenin	Mexico, Guatemala
Dioscorea deltoidea	Diosgenin	Napel, India, China
Dioscorea floribunda	Diosgenin	Cultivated in India
Duboisia leichharditii	Atropine	Cultivated in Australia
Eleutherococcus senticosus	Crude drug	CIS[2], China
Ephedra sinica	Crude drug, Ephedrine	China
Glycyrrhiza glabra	Glycyrrhizine, crude extract	Cultivated in Spain, Turkey, Iraq, China, Mongolia, CIS, South Africa, USA, France, Italy, Iran, Afghanistan, Syria, Lebanon, Israel, UK, China
Harpagophytum procumbens	Crude drug	South Africa, Namibia, Lesotho, Botswana
Hibiscus sabdariffa	Crude drug	Sudan, China, Thailand, Egypt
Hyoscyamus niger	Atropine, total alkaloids	Cultivated in temperate zones
Matricaria chamomilla	Crude drug	Cultivated in Eastern Europe
Panax ginseng	Crude drug and extracts	Cultivated in south Korea and China
Panax pseudoginseng	Crude drug and extracts	Japan
Papaver somniferum	Crude, morphine, codeine, thebaine	Cultivated in Turkey, India, Burma, Thailand
Pausinystalia yohimbe	Crude drug, yohimbine	Cameroon, Nigeria, Rwanda
Peumus boldus	Crude drug	Peru. Chile. Zaire
Physostigma venenosum	Physostigimine	Sierra Leone, Cameroon, introduced to and Brazil
Oilscarpus jaborandi	Pilocarpine	Tropical America especially Brazil
Plantago indica	Seed husks	Cultivated in India
Plantago ovata	Seed husks	Cultivated in India and Rwanda
Plantago psyllium	Seed husk	Cultivated in India
Rauvolfia tetraphylla	Reserpine	Not stated
Rauvolfia sellowii	Reserpine	Not stated
Rauvolfia serpentina	Reserpine, rescinamine, ajmaline,	Thailand, Zaire, India, Bangladesh, Sri

	ajmalicine, serpentine, crude drug	Lanka. Burma, Malaysia, Indonesia, Nepal
Rauvolfia vomitoria	Reserpine, ajmaline	Zaire, Mozambique
Rhammus frangula	Crude drug	Europe
Rhammus purshiana	Crude drug, casanthrosides	USA
Rheum emodi & R. webbianum	Crude drug	India
Rheum officinale & R. Palmatum	Crude drug	China
Silybum marianum	Silybin	Mediterranean region
Smilax sp.	Crude drug	Asia, Far East, India, Central and South America
Swertia chirata	Crude drug	India
Urginea india	Crude drug	India
Urginea martima	Crude drug, scillarin A & B	Mediterranean region, Egypt, Turkey
Valeriana officinalis	Crude drug	Cultivated in Japan
Valeriana wallichii (= V.jatamansi)	Crude drug	Cultivated in India

[1] From Farnsworth N. R ; Djaja D. Soejarto ; Global Importance of Medicinal Plants in O. Akerele et at eds Conservation of Medicinal Plants, Cambridge University Press, 1991.

[2] All instances of USSR in the orginal table have been replaced by Commonwealth of Independent States (CIS)

ANNEXURE-8

RECOMMENDED BASIC HERBAL RECIPES FOR TRIBAL AREAS IN ANDHRA PRADESH

FEVERS:

Composition Fresh leaves of Bhunimba ... 1 handful (7-8 gms)
Fresh stem of Guduchi ... 1 handful
Mature bark of Nimba ... 1 finger length (3-5 gms)
Rhizome of Ardraja... 1 small piece
Water ... 1 glass

Procedure Grind the leaves bark and stem with a small amount of water finely, add the remaining quantity of water and boil till it becomes half the quantity.

Dosage Take the whole obtained liquid as a single dose. It should be taken daily twice. In case of children half the dose is suggested.

Note This is useful in non specific fevers and Malaria. It is highly useful in viral Hepatitis and skin diseases.

ACHES

Stomachache :

Composition Rhizome of Ardraka ... ¼ Finger length
Seeds of Jiraka ... 1 teaspoon full (2-3 gms)

Procedure Pulverise the seeds, mix the roasted rhizome and grind the mixture finely with small quantity of water. Add the remaining quantity of water, stir and strain in to a tea cup.

Dosage Take the whole liquid as a single dose.

Note During the treatment, it is suggested to take soft food.

Earache :

Composition Fresh leaf of arka 1
Gingely or coconut oil- a sufficient quantity

Procedure Apply oil to leaf and wither it above a fire, roll between both hand palms until the juice come out.

Dosage Drop 2-3 drops in the car

Note Instantaneous relief from severe earache.

Headache:

Composition Powdered rhizome of Sunthi ... ¼ Teaspoon ful
Milk ... 1 Teaspoon ful

Procedure Mix the powder with the Milk.

Dosage 2-3 drops in each nostril for inhalation

Note This recipe gives instantaneous relief even in severe headache.

Bachache :

Composition The powdered Rhizome of Sunthi ... 1/2 Teaspoonful
The whole plan of Gokshura ... 5 (5-10 gms)
Water ... 2 glasses

Procedure Grind the drugs, add the water and boil the mixture until a glass of decoction is obtained.

Dosage 1 glass, twice a day.

Note It is especially useful in Backache.

Arthritis (joint pains):

Composition Powdered rhizome of Sunthi ... ½ Teaspoonful
Fresh stem of Guduchi ... 1 handful (3-5 gms)
Leaves of Nirgundi ... 1 handful (7-8 gms)
Water ... 2 glasses
Procedure Grind the leaves, stem and powder with a small amount of water finely, add the remaining quantity of water and boil till it becomes half the quantity.
Dosage Take the whole obtained liquid as a single dose. It should be taken twice daily.
Note It is very useful in joint pains.

DIARRHOEA & DYSENTERY :

Composition Roots of musta ... 6 (3 gms)
Bark of Kutaja ... 1 finger length
Pulp of Young fruit of Bilwa (finely cut) 1 teaspoonful
Water ... 2 Tea cups
Procedure Grind the leaves and salt with ½ tea cup of water, filter into a tea cup.
Dosage Take it as a single dose. Repeat the treatment twice a day.
Note In case of dehydration..
Composition sugar/jaggery ... 1 teaspoonful
Salt ... ¼ teaspoonful
Water ... 1 glass
Procedure Dissolve sugar and salt in water. Repeat several times as per necessity.

CONSTIPATION :

Composition Fruit of Aragwadha ... 1 finger length
Procedure Separate the pulp from the seeds.
Dosage Take the pulp as a single dose.
Note The pulp can be preserved as follows :-
Peel the fruit, add a sufficient quantity of water on the jelly like pulp until it is completely soaked. Boil until the pulp is separated from the seeds and strains. Boil the obtained liquid with a sufficient quantity of jaggery until it becomes thick and allow it to cool. Dry it in the sun for 3 to 4 days.

WORM INFESTATION :

Composition Fresh leaves of Asitakutaja ... 3
Water ... 1 glass
Fruit of Vidanga (powdered) ... 1 teaspoonful
Procedure Grind the leaves with powder and mix with water. Boil the mixture until ½ glass of decoction is obtained, allow it to cool and strain.
Dosage take the liquid as a single dose before breakfast. Repeat this for 5 days.
Note
Composition Thick Coconut milk ... 1 glass
Dosage Take thee coconut milk as a single dose before meal, preferably on an empty stomach.
Note Preferably make the coconut milk from a matured fruit. This preparation is especially effective against tapeworm.

COLD & COUGH :

Composition Leaves of Vasa ... 3

Leaves of Tulasi ... 10
Fruits of maricha ... 5
Juice of ginger ... 1 teaspoonful
Jaggery ... A sufficient quantity
Water ... 1 glass

Procedure Grind the leaves and fruits and mix with juice and water. Add jaggery and boil until ½ glass decoction is obtained.

Dosage ½ glass, twice a day

Note This is useful in coryza, bronchitis and dyspnoea

ANAEMIA :

Composition Powdered barkof Nimba ... 1 teaspoonful
Powdered leaves of Guduchi ... 1 teaspoonful
Powdered leaves of Vasa ... 1 teaspoonful
Fruit of Haritaki ... 1
Fruit of Amalaki ... 1
Fruit of Vibhitaka ... 1
Leaves of Bhunimba ... 1 handful
Water ... 2 glasses

Procedure Grind and mix all the ingredients add water and boil until ¼ glass of decoction is obtained.

Dosage ¼ glass should be taken in two divided doses.

Note This is also useful in viral Hepatitis

VIRAL HEPATITIES :

Composition Fresh juice of whole plant of Bhumyamalaki ... 2 Tablespoons

Procedure .....

Dosage 2 tabelspoonful, 2-3 times a day for 3-5 days

Note It is highly effective in jaundice. It is also having diuretic action and can be administred in Anuria.

SKIN DISEASES :

Scabies :

Composition Fresh leaves of Bhunimba ... 1 handful
Sulphur ... a Small amount

Procedure Mix the ingredients and grind until a homegenous mass is formed.

Dosage Apply the mass on the affected skin

Note Besides this medication, take the following preparation internally.

Composition Fresh leaves of Nimba ... 5
Fresh leaves of Bhunimba ... 7
Water ... 1 glass

Procedure Mix all the ingredients, boil until ¼ glass of decoction is obtained, and filter

Dosage 1 glass Once a day

Note This is also useful in Ringworm

FRESH WOUNDS AND ULCERS :

Composition Fresh leaves of Nimba ... 1 handfull
Rhizome of Haridra ... ½ finger length

Procedure Grind the leaves and rhizome until a homegenous mass is formed.

Application Apply the mass on the wounds and ulcers

COMMON FEMALE DISEASES :

Composition Root of Atibala ... 1 finger length

	Jaggery / sugar ... Sufficient quantity
Procedure	Grind the root with Jaggery/sugar until a pulpy mass is formed.
Dosage	The whole mass should be taken, twice daily.
Note	

LIST OF MEDICINAL PLANTS REQUIRED FOR BASIC HERBAL RECIPES

SL	Local Name	Botanical Name
1.	ATIBALA	ABUTILON INDICUM
2.	VASA	ABHATODA VASIKA NEES
3.	BILWA	AEGLE MARMELOS CORR
4.	BHUNIBA	ANDROGRAPHIS PANICULATA NEES
5.	SATAVARI	ASPARAGUS RACEMOSUS WILD
6.	NIMBA	AZADIRACHTA INDICA ADR.JUSS
7.	ARKA	CALOTROPUS GIGANTEA R.BR.
8.	CHAKRAMARDA	CASSIA ALAATA LINN
9.	ARAGWADHA	CASSIA FISTULA LINN
10.	NARIKELA	COCOS NUCIFERA
11.	JIRAK	CUMINUM CYMINUM LINN
12.	HARIDRA	CURCUMA LONGA LINN
13.	VIDANGA	EMBELLIA RIBES BURM
14.	AMALAKI	EMBLICA OFFICINALIS GAERTN
15.	SARIBA	HEMIDESMUS INDICUS R.BR.
16.	SUTAJA	HOLARRHENA ANTIDYSENTERICA WALL
17.	TULASI	OCTIMUM SANCTUM LINN
18.	BHUMYAMALAKI	PHYLLANTHUS URINARIA LINN
19.	MARICHA	PIPEER NIGRUM LINN
20.	AMRITA PHALA	PSIDIUM GUAJAVA
21.	DADIMA	PUNICA GRANAATUM LINN
22.	AMLIKA	TAMARINDUS INDICA LINN
23.	VIBHITAKA	TERMINALIA BELERICA ROXB
24.	HARITAKI	TERMINALIA CHEBULA REETZ
25.	GUDUCHI	TINOSPORA CORDIFOLIA MIERS
26.	GOKSHURA	TRIBULUS TERRESTRIS LINN
27.	NIRGUNDI	VITEX NEGUNDU LINN
28.	ASITA KUTAJA	WRIGHTIA TINCTORIA
29.	ARDRAKA/SUNTHI	ZINGIBER OFFICINALE ROSC
30.	ADARA	ZIZIPHUS MAMURITIANA

ANNEXURE-9

FIELD STUDY REPORT OF THE PADERU GROUP

DR. NISTESWAR

A team of Scientists consisting of Ayurvedic Physicians, Botanists and modern doctors have visited the tribal villages namely Gudem, Tajangi and Downuru of Chintapalli forest area. Tribal vaidyas have interviewed and information collected as given below to assess their involvement in the present project.

1. Symptoms reported by the patients
2. Line of treatment
3. Duration of treatment
4. Mode administration of drugs
5. Side effects
6. Non medical practices
7. Do's and Don'ts
8. Method of approach in case of failure of the treatment

These tribal vaidyas are belonging to Kondadora, Kondareddy, Kondaraju, Bagata, Valmikee and Kammari community.

Total Number of Doctors Interviewed	
Gudem	11
Tajangi	24
Downur	2

During the survey it was noticed that some of the doctors are specially rendering treatment for a few diseases only like jaundice, Hemiplegia, Leprosy, Intermittent fevers etc. The following are the conditions usually treated by the Tribal Vaidyas.

1. Headache, 2. Toothache, 3. Stomach-ache, 4. Worm infestation, 5. Joint pains, 6. Fever with chills and rigors, 7. Diarrhoea, 8. Dysentery, 9. Cough, 10. Breathlessness, 11. Jaundice, 12. Earache, 13. Constipation 14. Vomiting, 15. Leucorhea, 16. Cold, 17. Wounds 18. Menorrhagia, 19. Palpitation 20. Anaemia, 21. Depigmented patches, 22. Pruritus, 23. Pain in the eyes, 24. Corneal opacity, 25. Leprosy, 26. Snake bite, 27. Neuritis (expressed as Putika), 28. Abortion 29. Fractures, 30. Epilepsy, 31. Sexually transmitted diseases, 32. "Gali peedalu".

Majority of vaidyas are treating "gali peeda" a condition caused by evil spirits. Mantra and talismans are employed to treat this condition. Some vaidyas expressed that the God instructs them to use specific type of herb in a particular diseased condition. One lady tribal vaidya was interviewed who dispenses puja tirtham, (sacred water) for different conditions. Most of the vaidyas refused to reveal the names of drugs used in their clinical practice.

Two allopathic doctors working in local PHC were interviewed regarding the diseases prevalent in that area and details are as follows:

1. Anaemia, 2. Arthritis, 3. Malaria (P. falciparum type) **,** 4. Worm infection, 5. Lumbago, 6. Viral hepatitis, 7. Diarrhoea, 8. Dysentery, 9. Malnutrition, 10. Skin diseases (scabies, ring worms, eczema, Leprosy), 11. Tuberculosis, 12. S.T.D.

FIELD STUDY REPORT OF THE RAMPACHODAVARAM GROUP[50]

The party visited two tribal villages namely Pedamallapuram, off Sankhavaram and Boduluru, off Maredumilli amidst forest thickest to observe the Medicinal Flora and to interview the tribal vaids, known as ' Vejju' and "Pujari" who are said to have some expertise in Herbal Medicine and witch craft.

INTERVIEWS WITH VEJJUS.

The Medicine men belonging to Konda reddi, Konda Kappu, Kummari, Valmiki tribals dwelling in and around Peddamallapuram and Boduluru were interviewed and the following information gathered:

COMMON AILMENTS IN THE AGENCY AREA AS REPORTED BY THE TRIBAL VAIDS

1.Stomach ache due to various resons	21.Leucorrhea
2.Sprain and dragging pain in the lower and upper limbs	22. Menorrheagia
3. Back ache	23. Dysmenorrhea
4. Pain in the side ribs	24. Peptic ulcer
5. Joint pains	25. Constipation
6. Skin diseases such as scabies, Exzema, Pruritus, Pigment disorders, Boils, Fissured feet (Due to fungal infection), Urticaris, Abscess etc.	26. Urinary tract infections
7. Wounds due to injuries	27. Conjuctivitis
8. Malarial fevers	28. Asthma
9. Diabetes Mellitus	29. Worm infection
10. Jaundice	30. Conditions with Oedima
11. Anaemia	31. Tooth ache
12. Piles	32. Pneumonia
13. Diarrhoea	33. Palpitaion
14. Dysentery	34. Ear ache
15. Indigestion	35. Hiccups
16. Cough and difficulty in breathing	36. Bone fractures
17. Gonorrhoea	37. Antidote for scorpion sting and snake bite
18. Corneal opacity due to injury.	38. Liver ailments
19. Partial Paralysis, fits, Epilepsy and facial Paralysis	39. Neuritis.
20. Puerperal diseases.	

[50] Report prepared by Dr. Koppula Hemadri.

HERBAL CURE FOR ALL THE ABOVE AILMENTS

The tribals have revealed herbal cure for all the above ailments. Very often, they also said to chant oracles (mantras) and offer a "Talisman" in addition to the prescribed herbal medicine. "Pujaris" (Bhuta Vaids) however treat the patients suffering from "evil spirits" with Mantras (Oracles) or by using "Tantra" (Talisman) made of herbs or of animal origin. In such cases, the patients are profusely exposed to "Dhupa" (Smoke) obtained by burning various herbs and resins. (Most of these herbs and resins are recently proved to be antifungal, antibacterial and even antiviral).

KNOWLEDGE OF VARIOUS AILMENTS OTHER THAN ABOVE

In addition to the treatment for various ailments the tribals also revealed their knowledge in Dental Care and Preventive medicine in puerperal diseases. They offer aphrodisiacs, Galactagogues, Antifertility, Fertility promoting and Abortifacient recipes also. Some vejjus treat diseases of cattle.

TRIBAL MEDICINE

81 folk claims on tribal medicine have been recorded. All the herbs used in these treatment have been identified itself. An article on Tribal Medicine of Peda-amallapuram and Boduluru is being prepared separately.

MEDICINAL FLORA

The following medicinal plants are observed in the area visited. This list however is not complete. For complete picture, seasonal visits have to be paid.

1. Aristolochia india
2. Aristolochia bracteolata
3. Asparagus reacemosus
4. Cassia fistula
5. Helectares isora
6. Lannea coromandelica
7. Coccinea grandis
8. Euphorbia caudiciflora
9. Eeuphorbia hirta
10. Ailanthus excelsa
11. Oroxylum indicum
12. Hesperethusa crenulata
13. Annona squamosa
14. Alangium salvifolia
15. Wrightia tinctoria
16. Holarrhena antidysenterica
17. Phylanthus reticulatus
18. Phylanthus amarus
19. Jatropha curca
20. Jatrpha gossipifolia
21. Cassia auriculata
22. Clycosmis pentaphylla
23. Azadiradita indica
24. Derris indica
25. Anogeissus latifolia
26. Strychnos potatorum
27. Strychnos nax vomica
28. Acacia tortia
29. Cissus quadrangularis
30. Ecuphorbia barnhartii
31. Balanites aegyptiaca
32. Randia dumetorum
33. Morinda tomentosa
34. Moringa oleifera
35. Acacia chundra
36. Acacia leucophloea
37. Pterocarpus marsupium
38. Carica papaya
39. Cassia tora
40. Cassia occidentalis
41. Chloroxylon swietenia
42. Casearia graveolens
43. Semicarpus anacardium
44. Tamarindus indica
45. Syzygium cumini
46. Bambax ceiba
47. Adina cordifolia
48. Tridax procumbens
49. Marselia minuita
50. Securinga leucopiyrus

51. Alternanthera sessilis
52. Canthiium parviflorum
53. Bryophyllum pinnatum
54. Heliotropium idicum
55. Thevetia peruviana
56. Nerium indicum
57. Ficus benghalensis
58. Tephrosia purpurea
59. Sida acuta
60. Sida cordifolia
61. Sida cordata
62. Cyperus rotundus
63. Caesalpinia bonduc
64. Mucuna monosperma
65. Eentada pursaetha
66. Casearia tomentosa
67. Pueraria tuberosa
68. Artocarpus heterophyllus
69. Ficus hispida
70. Phyllanthus emblica
71. Mallotus phillippensis
72. Schleichera oleosa
73. Maytenus emarginata
74. Cassine glauca
75. Musa paradisiaca
76. Momordica charantea
77. Nicotiana tabacum
78. Piper longum
79. Phyla nodiflora
80. Ardisia solanacea
81. Phaphidophora pertusa
82. Tinospora condifolia
83. Sterculia urens
84. Tinospora sinensis
85. Schefflera venuilosa
86. Phanera vahlii
87. Solanum inicanum
88. Zanthoxylum limonella
89. Portulaca oleracea
90. Zingiber officinale
91. Streblus asper
92. Vitex negundo
93. Bambusa arundinacea
94. Woodfordia fruticosa
95. Dendroicalamus strictus
96. Tribulus terrestris
97. Aerides ringens
98. Tectona grandis
99. Ziziphus xylopyrus
100. Clerodendrum xylopyrus
101. Soymida febrifuga
102. Litsea glutinosa
103. Soymida zeylanica
104. Lygodium flexuisum
105. Solanum indicum
106. Solanum surattense
107. Curcuma angustifolia
108. Urginea sp.
109. Anogeissus acuminata
110. Elytraria acaulis
111. Capparis sepiaria
112. Capparis zeylanica
113. Holoptelea integrifolia
114. Cleome pentaphylla
115. Cleome viscosa
116. Andrographis papniculata
117. Putranjiva roxburghii
118. Acalypha indica
119. Gymnema sylvestre
120. Plumbago zeylanica
121. Plumbago indica
122. Curcuma longa
123. Clitoria ternatea
124. Pauvolfia serpentina
125. Clerodendrum serratum
126. Rauvolfia serpentina
127. Alstoniaa venenata
128. Amorphophallus rex
129. Curculigo orchioides
130. Chlorophytum arundinaceum
131. Cyptolepsis buchanani
132. Hemidesmus indicus
133. Pergularia daemia
134. Centella asiatica
135. Argyreia nervosa
136. Albizia lebbeck
137. Eclipta alba
138. Albizia lebbeck
139. Eclipta alba
140. Bauhinia racemosa
141. Dregea volubilis
142. Vernonia cinerea
143. Actinopteris radiata
144. Tylophora indica
145. Achyranthes aspara
146. Ocimum samctum
147. Ocium gratissimum
148. Ventiloga cialyculata
149. Enicostema hyssopifolium
150. Aegle marmelos
151. Hygrophila auriculata
152. Borreria articularis
153. Phyllantus maderaspatana
154. Cardiospermum halicacaburm
155. Merremia gangetica
156. Murraya koenigii
157. Grewia tiliaefolia
158. Terminalia chebula

159. Terminalia bellirica
160. Terminalia arjuna
161. Terminalia tomentosa
162. Limonia acidissima
163. Sapindus emarginatus
164. Dichrostachys cinerea
165. Cleistanthus collinus
166. Solanum torvum
167. Nyctathes arbortristis
168. Colocasia esculenta
169. Adiantum lunulatum
170. Gmelina arborea
171. Phoenix acaulis
172. Cissampelos pareira
173. Abutilon indicum
174. Acacia nilotica ssp.indica
175. Adhatoda vasica
176. Aerva lanata
177. Argemone mexicana
178. Azima tetracantha
179. Boswellia glabra
180. Butea monosperma
181. Calotropis gigantea
182. Calotropis procera
183. Chrozophora rottleri
184. Cipadessa baccifera
185. Cocculus hirsutus
186. Dodonaea viscosa
187. Erythrina indica
188. Evolvulus alsiinoides
189. Hedyotis umbellata
190. Hybanthus suffruticosus
191. Lawsonia inermis
192. Leptadenia reticulata
193. Madhuca longifolia var.latifolia