

SURVEY OF SOME IMPORTANT MEDICINAL PLANTS FROM EASTERN INDIA

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Very little work with regard to the distribution, availability and the efficacy of the various medicinal plants of Eastern India, particularly of Sikkim, Assam and North East Frontier Agency (N.E.F.A.) has so far been carried out. Many of the well-known workers on Indian medicine have dealt with the medicinal plants in general terms utilising most of the information from the published data gathered from various researches on the medicinal plants collected from Western Himalayan Zone and a few important localities in India.

As indicated above, majority of the important indigenous drugs available in the Indian market have been mostly collected from the Western Himalayan Zone whose climate is considered to be suitable for production of active principles in satisfactory percentages with the result that such collections in other parts of India, particularly from the eastern region have been mostly neglected. Such neglect, it must be admitted, is primarily due to the very inadequate knowledge of complete statistics of such drug plants or their allied species and varieties of that region, their accurate data in relation to climatic, edaphic and other ecological conditions, range of distribution in different habitats and altitudes, their chemical analysis, efficacy and other allied aspects. Such a detailed systematic survey of flora of the Eastern India with special attention to the medicinal, poisonous and other economic plants of the region partly known and unknown in the available literature and by the local people, is possible by a prolonged field work and such work was initiated by the author and is being continued by a small staff of the Eastern Circle of the Botanical Survey of India.

Distribution of the medicinal and poisonous plants and other allied species as given in most of the published literature has been recorded under very broad regions mostly with reference to different states. An attempt to present the distribution data mostly collected during the field work of the Botanical Survey of India (Eastern Circle) together with the nature of abundance of some of the important useful plants along Eastern India and a part of the adjoining Eastern Ghats of the Orissa and Andhra Pradesh and also Pachmarhi and surroundings of Bombay State as brief notes in the following paragraphs and the list of the species with details at the end, has been made.

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A detailed note with regard to the distribution and cultivation of *Rauwolfia serpentina* in Eastern India is also given in the concluding paragraphs.

Assam's vegetable wealth particularly with reference to the medicinal plants has been mostly unexplored. Along the plains occurrence of *Acacia catechu*, *Adhatoda vasica*, *Alpinia galanga*, *Cannabis sativa*, *Cassia alata*, *Cassia fistula*, *Gynocardia odorata*, *Holarrhena antidysenterica*, *Hydnocarpus kurzii*, *Rauwolfia serpentina*, *Strychnos nuxvomica*, *Vitex peduncularis* and several other species have been recorded, some of them growing in abundance in certain localities as noted in the list at the end. There are a few interesting plants considered as medicinally useful by the local people but strangely enough, no such record has been available in the published data. For example, the liquid developed in the Pitchers of *Nepenthes khasiana* (Plate 1:1) in small quantities varying from one ounce to a few drops before they are fully mature and open their attractive leafy lid at the top is considered by the 'War' community living in the Jorain area of Khasi & Jaintia hills of Assam, to be a good remedy for urinary troubles if administered orally and for redness and itching of the eye if used as eye drops. This liquid has been sent to the Central Drug Laboratory for analysis and the result† is being awaited with interest. A few more localities of the occurrence of *Nepenthes* other than Tura area of the Garo hills have been recently recorded. Similarly, a few more medicinal plants such as, *Lasia heterophylla*, *Stemona tuberosa* and others are in common use by the local 'Kavirajas' (Ayurvedic Doctors). Several new localities and quantities available in various medicinal plants, common and uncommon as given at the end of this paper are now being recorded by intensive field work. Underground corms of *Arisaema consanguineum* (Plate 1:2) recently collected from various parts of Khasi & Jaintia hills of Assam and analysed at the Central Drug Research Laboratory have evinced much interest regarding its poisonous glucosides and additional collections of the same have been made and sent for further work on the subject.

Along the various divisions of the North East Frontier Agency, a few samples of drug plants

†Analysis could not be completed for want of more liquid.

well-known in those respective areas have been studied. Detailed study on the distribution along the regions surrounding Pangchen, Bum La and Mago (4200-4700m. altitude zones of the Kameng Frontier Division) of *Aconitum palmatum* (Bhongnakarpo), *A. luridum* (Bhongnamarpo) and *Cordyceps* species ('Yartsa Gumbu') well-known in the Tibetan medicine but not properly worked out in India together with a few other important drug species commonly collected by the Tibetan herbal collectors along these altitudes is worth undertaking to gather proper collections in suitable stages of growth for chemical analysis etc. The two *Aconitum* species noted above are reported to be occurring in considerably good quantities along those altitudes but *Cordyceps* species has been observed to be rather rare evidently due to its nature of development and its size. Rhizomes and roots of young plants of *Podophyllum emodi* (*P. sikkimensis*) (Plate 1:3) newly recorded as common and collected by the another during May and June of 1957 from the valley (4200m.) between Se La and Jhang of the Kameng Frontier Division in mostly early flowering stage have yielded satisfactory percentage of resin content as reported by the Central Drug Laboratory and hence further details are worth investigating. Rhizomes of *Coptis teeta* ('Arong') (Plate 1:4) well-known in the Indian medicine and fruits of *Skimmia laureola*, ('Dising') (Plate 2:1) have also been considered to be medicinally useful by the local tribes along the Mishmi hills of the Siang Frontier Division and the Subansiri Division respectively. The specimens of *Skimmia laureola* occurring in the Eastern Himalayas have been considered by some as slightly different from the normal species. Further, there is so far no record of the medicinal uses of the fruits of this species which are supposed to be used by the tribal people for the treatment of gastric pain. *Fritillaria cirrhosa* ("Yathu") (Plate 2:2) not known in the Indian medicine and recorded to be occurring at about 4000-5000 m. along the Himalayas from Eastern Nepal to S.E. Tibet and Yunnan have been collected from slightly lower altitudes along the Dichu valley in Lohit Frontier Division and the tiny dried, starchy bulbs are considered to be of high medicinal value by the local tribes. Material of the same has been sent to the Central Drug Laboratory for chemical analysis to enable the Department of Botanical Survey to carry out further studies on its distribution and availability. Similar species has also been collected from the Sikkim State along the slopes surrounding Kupup (4400 m.). A few locally known drug plants such as species of *Zanthoxylum* ('Jabrung') and *Litsaea* ('Nye') have also been collected from Rupa valley and hill slopes surrounding Nyukmadong respectively of the Kameng Frontier Division during the recent

field study by the Department of Botanical Survey.

A few details with regard to the distribution in the Sikkim State of several interesting medicinal and other groups of plants such as species of *Aconitum*, *Thalictrum*, *Berberis*, *Podophyllum*, *Geranium*, *Zanthoxylum*, *Rhus*, *Gaultheria*, *Swertia*, *Picrorhiza*, *Arisaema*, *Ephedra* and others have been recorded during the recent field studies (vide list at the end of this paper). The percentage of active principles as reported by the Central Drug Laboratory from the material of *Ephedra sexatilis* var. *sikkimensis* (Plate 2:3) collected from Thangu surroundings (4500 m. North Sikkim) during May, 1955 has not been very encouraging but as Chopra and others have pointed out, study of some more collections of different stages of growth from comparatively drier slopes in that region in different seasons appears to be essential before any opinion is offered with regard to their approach to the Indian Pharmacopoeial standards. *Podophyllum emodi* var. *sikkimensis* has been observed to be occurring quite rare along the slopes surrounding Gnathong (4200 m. East Sikkim) possibly due to very frequent collection of rhizomes and also the edible fruits by the local inhabitants. Availability of *Picrorhiza kurrooa* in considerably good quantities along the slopes surrounding Changu (4000 m.) is worth investigating in further details. Interestingly enough, rhizome of *Astilbe rivularis*, *Iris ensata*, root of *Daphne cannabina* and *Selinum tenuifolium*, stem of *Viscum articulatum* and stem and root of *Clematis montana* which are comparatively less known in the Indian medicine, are said to be used medicinally by the local inhabitants of Sikkim. These species occur in different parts of Sikkim, sometimes abundant locally and it is worth investigating their medicinal qualities or other economic properties together with many other well-known medicinal plants, such as *Swertia chirata*, *Dichroa febrifuga*, and poisonous, insecticidal and essential oil-bearing species of *Arisaema*, (of which many species are available in Sikkim), *Artemisia*, *Gaultheria*, *Asclepias*, *Zanthoxylum*, *Skimmia*, *Hedera*, *Jasminum* and others from different parts of the Sikkim Himalayas.

Along the various tracts of Bihar and West Bengal (Plains) several medicinal herbs have been recorded. *Grewia tenax* (-*G. populifolia*) recently recorded as possessing useful medicinal properties and growing in Bihar and West Bengal, has a wide distribution in different parts of India, including Assam and is worth studying, with regard to its utility as a medicine. Along the different forest tracts of Orissa, several common medicinal and poisonous plants known for the tropical areas of India, have been recorded. During the recent field work in the Rebna and Keonjhar forests of Orissa, specimens of *Holarrhena antidysenteric*

and species of *Polygala* and *Sansevieria* the roots of which are locally reported as good antidotes for snake bite, have been collected from Sukinda, Palaspal and Ghatgaon and their actual medicinal utility together with a few others such as *Clausena excavata*, *Vanda tessellata*, *Andrographis paniculata* etc. commonly used in Orissa for Ayurvedic medicines, is worth investigating. Roots of *Holarrhena* collected from that locality and whose medicinal properties are not so well-known, have been sent to Central Drug Laboratory for proper analysis. Similarly, several important medicinal and poisonous plants such as *Tinospora cordifolia*, *Sida* species, *Ailanthus excelsa*, *Balanites aegyptiaca*, *Soymida febrifuga*, *Walsura piscidia*, *Elaeodendron glaucum*, *Dodonaea viscosa*, *Cassia auriculata*, *C. fistula*, *Terminalia* species, *Hemidesmus indicus*, *Strychnos nuxvomica*, *Argyrea speciosa*, *Dioscorea* species, *Stemona tuberosa* etc. have been collected by the Botanical Survey of India during their field work in 1947 along the Rampa and Gudem agency tracts (Eastern Ghats) of the East Godavari and Vizag districts of the Andhra Pradesh. An interesting record of *Vitex peduncularis* var. *roxburghiana* (Plate 2:4) along the North Eastern slope of Sesharyi hill of the Eastern Ghats (East Godavari Distt.) during the same field study is worth investigating further. Similarly, occurrence of aromatic grasses like *Cymbopogon coloratus* and *Vetiveria zizanioides* along the Rampa hill surroundings and shrubs of *Nyctanthes arbor-tristis* in profuse wild state along the open land near Mattambhimavaram (Eastern Ghats, East Godavari Distt.) may profitably be worked out if suitable for essential oil extraction. Along the Pachmarhi and Khandwa regions of the Vindhya Ranges, most of the common medicinal and poisonous species as noted above have been collected by the Botanical Survey of India. Besides these, sufficiently good development of *Jasminum* species and *Micromeria biflora* in the Pachmarhi area and extensive growth of *Cymbopogon martini* along the slopes near Khandwa and Asirgarh fort (Bombay State), may be of considerable utility for the essential oil production if the results after analysis are satisfactory. More data on medicinal plants of the various States noted in this and the preceding paragraphs are still to be collected by further field studies of Botanical Survey of India.

Note on Genus *Rauwolfia*

The genus *Rauwolfia* has become quite well-known with its several species containing valuable medicinal properties and particularly *R. serpentina* (Plate 3:1). The various species such as *R. beddomei* Hook. f. (Plate 3:2) from India and Far East, (= *R. canescens* Linn.) *R. tetraphylla* Linn. (Plate 3:3) an, exotic from West Indies growing

wild but sparsely distributed in South Indian hills, *R. heterophylla* Willd. ex Roem. & Schultz. of South America *R. natlensis* Sond. of South Africa, *R. densiflora* Benth. ex Hook. (Plate 3:4) of Malaysia and *R. perakensis* King & Gamble from Malaya and surroundings besides of course *R. serpentina* have been subjected to much investigation by several workers in India and other parts of the world for the different types of alkaloids. Though interesting results have been observed from the various Malaysian species of the genus such as *R. chinensis* Hemsl. (= *R. verticillata* Baill.), *R. javanica* Koerd. & Valet., *R. sumatrana* Jack, *R. madurensis* Burck. ex Koorders-Schum., *R. reflexa* Teijsm. & Binn., *R. spectabilis* Boerl. and *R. amsoniaefolia* A. DC. and also the African species *R. vomitoria* Afzel. the status of many of the species is open to question. Similarly there are a few more species in other parts of the world, particularly, Africa and America. In view of the intensive Phytochemical work on the Genus, it has become very necessary that a thorough taxonomic revision of the Asian and American species of the genus should be taken up as early as possible.

As regards distribution of *Rauwolfia serpentina* in India, considerable data have been gathered from various sources including the four regional Circles of the Botanical Survey of India. Besides its occurrence in wild state in different parts of sub-Himalayan tracts of Western, Central and East Himalayas and the Western and Eastern Ghats, several localities of its growth in various parts of Eastern India such as Rebna, Ranjahgarh, Koenjahar forests of Orissa hill tracts, Rajmahal hills of Bihar, Buxaduar and Cooch Bihar reserved forests of West Bengal, Goalpara, Kamrup and other districts of Assam, foot hill areas of Kameng and Subansiri divisions of North East Frontier Agency, Cherilam reserved forests of Tripura state and a few other localities of Far Eastern part of India have been recorded by the Eastern Circle of the Botanical Survey of India. But it has always been found by the author that quantities available in wild condition are quite meagre.

Now in view of the high demand for the species, the supply from the present wild sources is being exhausted gradually thus becoming totally inadequate to meet the demand.

Hence, systematic cultivation mostly by root cuttings and partly by seeds, though in small areas, has been taken up by the forest departments of various states such as Uttar Pradesh, Bombay, Bihar, Bengal, Madras, Orissa, Assam and Jammu & Kashmir. The cultivation of this species by the Assam Forest Department even though on a small scale along the lower part of the Khasia hills below Nongpoh, has been most successful yielding

considerable quantities of good quality root. Similar cultivation by the Orissa forest department in Koraput district of the present Dandakaranya region has been found yielding smaller size roots. There are, no doubt, several suitable regions both in the foot hills of NEFA and in Tripura besides several parts of Assam, for expanding cultivation of this species but such expansion might be taken up as the demand for this root gradually increases.

Medicinal Species of Cryptogams

The medicinal or the toxicological aspects of the Indian Cryptogams are still quite an unknown field. Some algae cause poisoning; others growing in lakes and ponds make the water distasteful and obnoxious. A few Indian Pteridophytes such as *Lycopodium*, *Ophioglossum*, *Equisetum*, *Osmunda*, *Botrychium*, *Adiantum*, *Asplenium*, *Davallia*, *Athyrium* and a few other ferns are reported to be of medicinal value. Lower fungi such as *Penicillium*, *Aspergillus* etc., are too well-known to be explained here. Higher fungi both of fleshy and woody groups such as the poisonous mushrooms and the Polyporin of the Polyporales and also those groups belonging to Ergot and Smuts etc. have already made their name. Recently some of the Bryophytes particularly mosses have been reported by Arizona State University Research Body to be containing very powerful antibacterial toxins in their extracts to inhibit the growth of *Micrococcus* and *Streptococcus* groups. Lichens such as *Parmelia*, *Usnea* and *Rocella* have yielded interesting acids and other contents showing promise of utilisation in medicine and industry. But in spite of these, it must be admitted that our knowledge on the medicinal properties of the Cryptogams as a whole is very fragmentary and our knowledge on the taxonomy of the Indian Cryptogamic species which form the main basis for the Phytochemical studies, is rather very imperfect. A few hundreds of specimens belonging to all the lower groups have been collected from different interiors and high altitudes of East Nepal, North—East Frontier Himalayas, Khasi and Jaintia hills besides plains of Assam, Bihar, Bengal and Orissa of Eastern India. They are now well preserved in the herbarium of the Eastern Circle, Botanical Survey of India, awaiting identification by the several experts in the respective groups.

In olden days either during the Assyrian, Vedic, Greek, Roman, Arabian or even in modern European periods, the problem of correct determination of the plants has always been considered to be the most important and foremost part of the study of drug plants. Anyone who deals with plants and plant materials either from scientific, medicinal or commercial point of view must be

primarily acquainted with the correct identity and the genuine nature of those species. Confusion that usually follows by carrying out certain undertakings on the basis of wrong identification is quite well-known and need not be discussed here. There have been several so called wonder drugs of the ancient days such as the 'Soma' plant, 'Jyothismathi', 'Hrudanti' and even 'Brahmi' or 'Manduka Parni', about whose correct identity considerable confusion exists due to lack or loss of proper literature but still, several drugs of these by different pharmaceutical firms are being prepared on the basis of certain presumptions and speculations. In the earlier works notes on distribution in relation to the names of countries so called in those times were recorded with the utter neglect on details of correct identification. It is, therefore, equally essential to maintain and preserve for the posterity authentically identified herbarium specimens of the various medicinal, poisonous and other useful plants. As, such herbaria are maintained on very small scale, mostly based on very old collections at the School of Tropical medicine and a few other Drug Research institutes including Ayurvedic Research, attempts are being made to develop such a herbarium on a larger scale for medicinal plants etc., together with the various plant parts used, as a section at each of the different herbaria, both in the Central office (including Industrial section) and the four Regional Circles of the Botanical Survey of India.

Some of the important species of medicinal value collected from different localities of Eastern India are enumerated below systematically. An analysis of such an enumeration containing only selected species indicates that the following families are well represented in the order of sequence noted below. The number of species under family is indicated within the brackets. I Ranunculaceae (7), II Rutaceae (6); Papilionaceae (6), III Berberidaceae (5), IV Compositae (4); Oleaceae (4), V Rubiaceae (3); Apocynaceae (3); Verbenaceae (3).

Such an order, though not in close conformity with the order of sequence based on the entire Indian medicinal plants, the important families noted in such a list, such as, Papilionaceae, Compositae, Rubiaceae, Rutaceae, Ranunculaceae and Apocynaceae are as well represented in the sequence of families of the selected Eastern Indian medicinal plants.

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1. *Nepenthes khasiana* Hook. f. (Loc. Jorain, K. & J. Hills, Assam.)



2. *Arisaema consanguineum* Shott. (Loc. Shillong, Assam.)



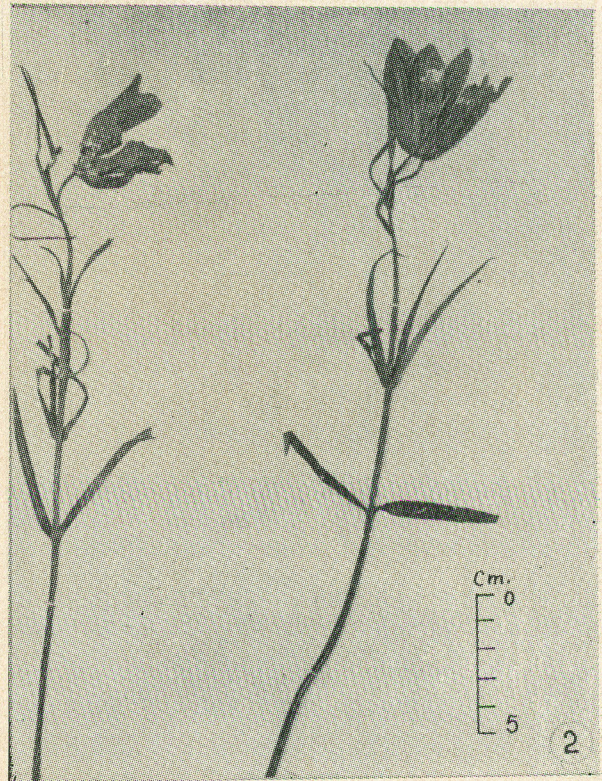
3. *Podophyllum emodi* Wall. (Loc. Se La-Zang valley, Kameng Frontier Division, N.E.F.A.)



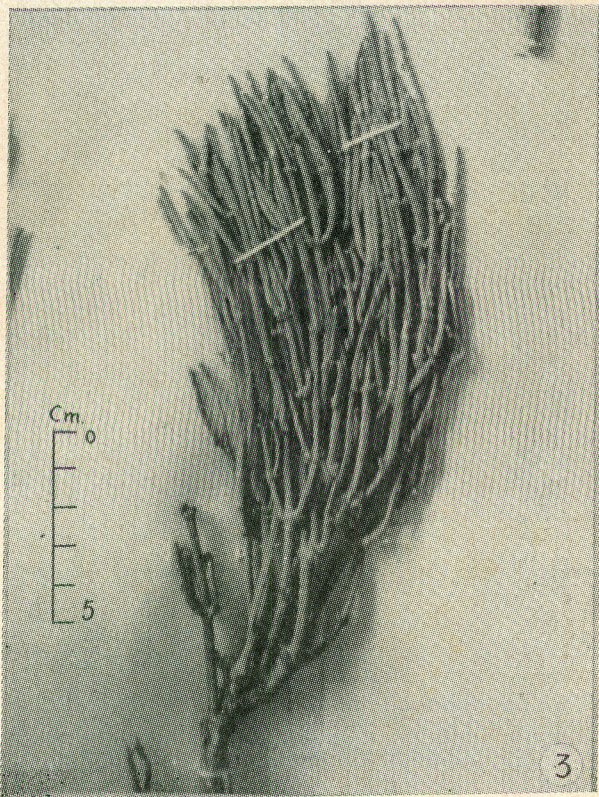
4. *Coptis teeta* Wall. (Loc. Mishmi hills, Siang Frontier Division, N.E.F.A.)



1. *Skimmia laureola* Sieb. & Zucc. ex Walp. (Loc. Bomdi La-Dirang Dzong, Kamehng Frontier Division, N.E.F.A.).



2. *Fritillaria cirrhosa* D. Don (Loc. Changu-Kapup area, Sikkim).



3. *Ephedra sexatilis* Royle var. *sikkimensis* (Stapf) Florin (Loc. Thangu area, Sikkim).



4. *Vitex peduncularis* Wall. var. *roxburghiana* Cl. (Loc. Deboka Reserve, Nowgong Distt., Assam).



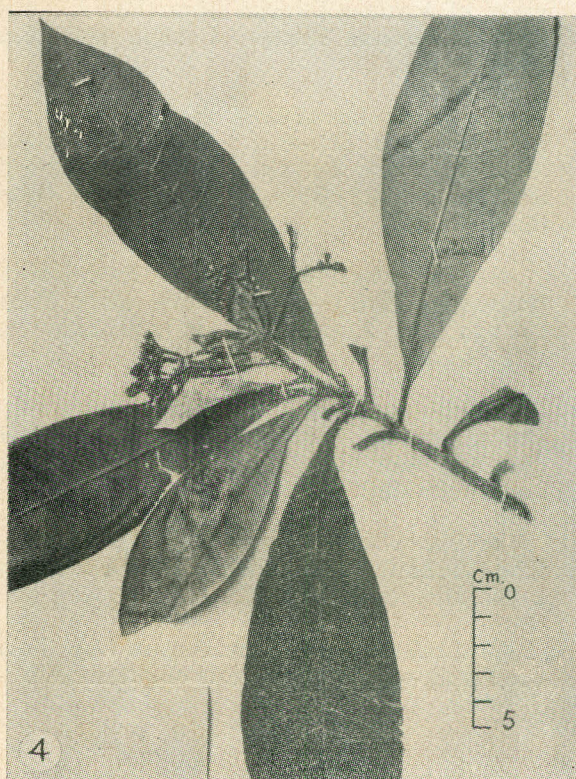
1. *Rauwolfia serpentina* Benth. (Loc. Ettapadappu area, Kerala).



2. *Rauwolfia beddomei* Hook. f. (Travancore).



3. *Rauwolfia tetraphylla* Linn. (Loc. Poona, Cult).



4. *Rauwolfia densiflora* Benth. ex Hook. f. (Loc. Pangtum K. & J. Hills, Assam).

APPENDIX

Enumeration of Species

- (i) Vernacular name: Language of vernacular name is given in brackets at the end of each name and the abbreviations mean as S=Sanskrit; H=Hindi; B=Bengali; A=Assamese; T=Tibetan; N=Nepali; K=Khasi; P=Punjabi; O=Oriya.
- (ii) Locality: All the localities are noted on the basis of collections available at the Eastern Circle Herbarium, Botanical Survey of India, Shillong. Respective field numbers with Collector's names are omitted here.
- (iii) Availability: Abbreviations indicating the nature of availability are given at the end of locality. They are as A4=Abundant; A3=Common, or less abundant; A2=Frequent or here and there or less common; A1=Not common or rare.

RANUNCULACEAE

Aconitum luridum Hk.f. & T. Bish (H) and (B); Bhongna-marpo (T).—Loc: Bum La, Pangchen areas of Kameng Frontier Divn. (NEFA); higher altitudes around Thangu, Changu and Kupup (Sikkim). A2.

Aconitum palmatum D. Don Bish (H) and (B); Bhongna-karpo (T).—Loc: Bum La, Pangchen areas of Kameng Frontier Divn. (NEFA); higher altitudes around Thangu, Changu and Kupup (Sikkim). A2.

Anemone obtusiloba D. Don Ratanjota (P). (Poisonous Plant).—Loc: Slopes along Thangu, Changu and Kupup (Sikkim); SeLa area (NEFA). A3.

Clematis montana Ham. Jermai-thobawa-Synt; Penace lara (N).—Loc: Rsong Forest, K & J Hills (Assam); Aka Hills (NEFA); Chung Thang, Lachen (Sikkim). A2.

Coptis teeta Wall. Mamira (H), (T), (A) and (B); Tita (Mishmi).—Loc: Mishmi Hills, Dibhang and Lohit Divisions (NEFA). A3.

Ranunculus scleratus Linn. Angijal (A). (Poisonous Plant).—Loc: Many parts of Assam. A2.

Thalictrum foliolosum DC. Pinjari (H).—Loc: Happy Valley near Shillong; (Assam) Kohima (NHTA); different parts of NEFA and Sikkim. A3.

MAGNOLIACEAE

Michelia champaka Linn. (Essential oil yielding plant). Sarna champa, Halodhia sapa (A).—Loc: Haltugaon, Jatinga, North Cachar Hills, Shillong, K & J Hills, Garo Hills Sadia Sibsagar (Assam); Aka Hills (NEFA); Naga Hills (NHTA); Saranda (Bihar); Mayurbanjh, Bonai (Orissa). A2.

MENISPERMACEAE

Stephania glabra (Roxb.) Miers.(= *S. rotunda* Lour.) Soh-jing-um-lang-sang (K).—Loc: Jakai reserve, Laluka, Batasipur, Nardwar (Assam); Aka Hills, Laomoon (NEFA). A2.

Stephania hernandifolia Walp. (Poisonous plant). A. Kanadi; Agnad nemuka (B).—Loc: Kalioni, Gourisagar, Telidonga bank, Dikhamukh, Sibsagar, Batasapur of Darrang (Assam), Pasighat (NEFA) and other parts of Assam, Bihar, Bengal and Orissa. A2.

BERBERIDACEAE

Berberis asiatica Roxb. Kilmora (H).—Loc: Aka Hills (NEFA); Kameng Frontier Division (NEFA). A1.

Berberis insignis Hk. f. Timburjhin (Lepcha).—Loc: Aka Hills (NEFA); Darjeeling (West Bengal); Chungthang to Lachen (Sikkim). A1.

Berberis umbellata Wall. ex Don var. *briani* Ahrendt.—Loc: Sikkim (Eastern ranges). A1.
Berberis wallichiana DC. Dieng-niang-mat-Shynarang (K).—Loc: Khasi Hills (Assam); Surroundings of Lachen and Lachung (Sikkim). A2.

Podophyllum emodi Wall. Papri (H) and (P).—Loc: Se La—Zang Valley (NEFA); Gnathong (Sikkim). A2.

BIXACEAE

Gynocardia odorata R. Br. Chalmugra (H); Chalmugru (B).—Loc: Umsaw forest, Holongapar reserved forest, Khasi Hills, Nongpoh, Desai Reserve, Moraine, Nangkhlaw, Sadia, Jeypore forest, Tura forest, Gongri village, Bhouragari, Bhalukpong (Assam). A3.

Hydnocarpus kurzii (King) Wall. Chalmugra (A).—Loc: Jamuguri, Sibsagar Dt. (Assam); Lawachurra and Longai reserved forest (Sylhet); Chirang forest (Tripura). A3.

GUTTIFERAE

Garcinia morella Desr. Tamal (H) and (B); Sunderkan (Sylhet); Thoi koy (Lushai). (poisonous plant).—Loc: Mahadeo forests, Jeypore Reserve, Pippum, Nangaghta, (Lakhimpur); Bhalukpung (Darrang); Barak, Bhuban Hill (Cachar); Single reserve (Sylhet); Tura forest (Garo Hills). A2.

MALVACEAE

Abutilon indicum (Linn.) Sweet. Kanghi (H); Japatri (A).—Loc: Nongpoh, Burnihat, Kamrup, Southern range Sibsagar, Haltugaon, Lanka, Nowgong, Dehingi bank, North Cachar Hills, other plain areas (Assam). A3.

Sida rhombifolia Linn. (Poisonous plant). Saha-devi, Swet Berela (H); Pitbala, Swetberela (B); Harrum-boi-ral (Kamrup-A).—Loc: Umteswar forest, umshaw, Nongthymmai, Mawphlong, Hologapar, other parts in plains of Assam, Bihar, Bengal and Orissa. A2.

GERANIACEAE

Geranium napalense Don. Bhond (H).—Loc: Shillong, Lait-ling-kot (Assam); Aka Hills (NEFA); different parts of Sikkim. A2.

RUTACEAE

Clausena excavata Burm. Agnijala, Agnikumari, Narsingha (A).—Loc: Nowgong, Sibsagar, Cachar, Garo Hills (Assam); Chatgaon, Malayagiri (Orissa). A3.

Feronia limonia Swingle.—(*F. elephantum* Cor.) Elephant apple or wood apple; Kaith (H); Kait. Kath-bal (B).—Loc: Keonjhar forest and other plain forests (Orissa). A2.

Skimmia laureola Sinch & Zucc. ex Walp. Chumlani (N); Dieng-intlant (K).—Loc: Sohrarian, lum suar, Serrarim, Nonglauri, Dungep, Mawphlong forest, K & J Hills (Assam); Naga Hills; Bompua La; Subansiri Fr. Divn. (NEFA); Sikkim. A2.

Toddalia asiatica Lam.—(*T. aculeata* Pers.) Siasoh-sat (K); Kada-todli (B); Kanj (H).—Loc: Shong-Pung, Peak forest, Shillong Peak, Umdong Valley, Diphu, Mawphlong, Khasi Hills, Mairang

(Assam); Aka Hills (NEFA); Keonjhar forests (Orissa). A3.

Zanthoxylum acanthopodium DC. Nipali-dhanya (H); Bogaytimur (N); Sohjing-buing (K).—Loc: Mawflong, Sohrarain Rd., Umdong Valley, La, Khasi Hills, Dumpep, Shillong, K & H Hills (Assam); Adogiri (Garo Hills). A2.

Zanthoxylum hamiltonianum Wall. Purpuray timur (N); Tez-mai-bih (A).—Loc: Nowjan, Singhduara, Gowrisagar, Moriani, Hologapar, Golaghat, Sonari, Sibsagar, Haltugaon, Jeypore (Assam); Aka Hills, Dikrang (NEFA). A2.

CHALLETIACEAE

Chailletia gelonioides Hkf.—(*Dichapetalum gelonioides* Engl.) Maokurra (B); Ding-rali-arung—(A). Loc: Umsaw, Umteswar (Khasi Hills), Barapathar, Rangapahar, Jamguri, Digboi, Margharita (Assam). A2.

ANCARDIACEAE

Rhus succedines Linn. Kakarsingh (H); Kakra-sringri (B); Raniwalai (N); Dinghain (K). (Poisonous plant).—Loc: Mausmai, Sohrarim, Sweetfalls, Barapani, Shillong peak, Gaughati-Shillong Road, Sibsagar, Lakhimpur, North Cachar Hills (Assam); Naga Hills (NHTA). A2.

Semecarpus anacardium Linn. f. Bhela (H) and (B) and (A); Dieng soh, bhala (K).—Loc: Nongpoh, Umsaw, Umran, K & J Hills; Near Salong Reserve, Nowgong; Haltugaon (Goalpara), Tiru Hill Reserve, Sibsagar, other plains of Assam; forests of Bengal, Bihar and Orissa. A2.

PAPILIONACEAE

Abrus precatorius Linn. Rati (A). (Poisonous plant).—Loc: Meulvi bazar, Silghat, Nalbari and other plain areas of Assam; Plain areas of Bihar; Bengal and Orissa. A2.

Derris ferruginea Benth. Makoi sopa (A); Raphang-doukha, Aru (A).—Loc: Umsaw, N. Range, Elemgnora, Panigaon, Doboka, Haltugaon, Sadia, Chardwar (Assam); Dhikari (NEFA). A3.

Entada scandens Benth. Gila (H) and (B); Gilalewa (A).—Loc: Umsaw forest, Khasi Hills, Jaintia Hills, Chardwar, Kokrajhar, Doyang Reserve, Goalpara, Sapekhati, Panigaon (Assam). A2.

Milletia pachycarpa Benth. (Poisonous plant).

Bririk (Lepcha); Hehel Santali).—Loc: Shella, 6 miles on G. S. Road, Umsaw, other Khasi hills, Sibsagar, North range and Lakhimpur, Tezpur, Darrang, Lumding, Nowgong, Kalingduar, Lowacherra, Sylhet, Kochugaon, Goalpara (Assam); Pasighat, Aka Hills (NEFA). A2.

Mucuna prurita Hook. Kivanch (H); Bandar kekua (A).—Loc: Rangapohar, Sibsagar Dt. and other areas in Assam, Bihar, Orissa. A2.

Trifolium repens Linn. (Poisonous plant) *Shaftal*, Shotul (P); Ghurg (Pushtu).—Loc: Upper Shillong, Shillong (Assam); lower altitudes of Sikkim. A2.

CAESALPINIACEAE

Cassia alata Linn. Bordadigdiga (A).—Loc: Barapathar (Sibsagar), Tharia, K & J Hills, Cachar, Jeyapore (Assam). A2.

Cassia fistula Linn. Amaltas and Girimalah (H); Sundali and Amultas (B); Sonaruphang (A).—Loc: Silchar, Goalpara (Assam); plain areas in Bihar and Orissa. A2.

MIMOSACEAE

Acacia catechu Willd. Khair (H) and (B); Khairia (A).—Loc: Rangapohar, Sibsagar, Haltugaon, Ranikata, Goalpara (Assam). A2.

Pithecolobium bigeminum Benth. (Poisonous plant). Kachlora (H).—Loc: Dulong Reserve, Chhatak of Sylhet, and other parts of Assam. A2.

SAXIFRAGACEAE

Astilbe eivularis Ham. Budivakthi (N).—Loc: Singhik and other lower slopes (Below 2,000 m.) in Sikkim. A2.

Dichroa febrifuga Lour. Busk (H).—Loc: Laitling-kot, upper Shillong, Langkyrdom, Shangpung, Shillong, Rangring, Lakhimpur Dt. (Assam). A2.

DROSERACEAE

Drosera peltata Sm. Mukhajali: (H).—Loc: Laitkar forest, Peak forest, Cherra, Barapani, Mamulu, Shillong, Jowai (Assam); Jhaag to Towang (NEFA); Lachung (Sikkim) A3.

MYRTACEAE

Careya arborea Roxb. Kumbhi (S); Kumbi (H) and (B). (Poisonous plant).—Loc: Nongpoh,

Kamrup Dt., Chardwar, Barni forest, North Kamrup reserve forest, Goalpara Dt. (Assam). A3.

Eucalyptus maculata Hook. Tarpin Gach (A). (Essential oil yielding plant).—Loc: Lushai Hills (Assam), Longai (Sylhet). A1.

ARALIACEAE

Hedera helix Linn. Dudela (N); Mei-peo-sree (K).—Loc: Laitling-kot, Mawlang forest, Khasi Hills, Rang-um-tie, Lyndoh forest, Mawphlong, Shillong, K & J Hills (Assam); foot hills of (NEFA). A2.

CAPRIFOLIACEAE

Viburnum foetidum Wall. Dieng-soh-lang (K).—Loc: Elephant falls, Khasi Hills, Mawphlong, Nongpoh, Jowai Rd., Shadow forest, Nursery Hill, Shillong near Sorrarisu, Upper Lumpurring, Nongkrim, Laitling-kot, Rifle ranges, Mausmai, K & J Hills (Assam); Loacherra (Sylhet); Lower altitudes of Sikkim. A2.

RUBIACEAE

Hedyotis auriculata Linn. Gatta-colla-Sing.—Loc: Inner Line Reserve (Cachar); K & J Hills (Assam). A2.

Ophiorhiza mungos Linn. Gandhanakulu (B); Sarahati (H).—Loc: Mausmai, K & J Hills (Assam). A2.

Paederia foetida Linn. Khip (H); Gandhabadulia (B); Bidisutta (A); Rikang-nemtu (Mikir).—Loc: Rait Laban, Haflong, Haltugaon, Tongtung, Elephant Falls, Mawphlong, Kharikhana, Mowgong, Lakhimpur (Assam). A2.

VALERINACEAE

Valeriana hardwickii Wall. (Essential oil yielding plant).—Loc: Elephant Falls (Shillong-Assam). A2.

Valeriana wallichii DC. (Essential oil yielding plant). Tagara (S); Tagar, Nahani (H) and (B). Loc: Elephant Falls—Shillong (Assam). A2.

COMPOSITAE

Artemisia vulgaris Linn. (Poisonous plant). Negdera (H) and (B).—Loc: Kohima (Naga Hills, NHTA); Tura top (Garo Hills); Aka Hills (NEFA); Haltugaon, 29th Mile Cherra road, Barapani (Assam); Slopes below 3000 m in Sikkim and also in Khasia Hills, Assam. A3.

Eclipta prostrata Linn.-(*Eclipta alba* Hassk.) Bhinghrajia (S); Bhangra (H); Kesuti (B); Kehregi

(A).—Loc: Gauhati, Digboi, Sibsagar, Goalpara (Assam); Aka Hills (NEFA). A3.

Spilanthes acmella Linn. Akarkara (Bombay); Akarkhara (P).—Loc: Barapani, Nongpoh, Myniss, Laitkor forest, K & J Hills (Assam); Girimuk; Kohima (NHTA); Aka Hills, Pasighat (NEFA); lower altitudes of Sikkim. A2.

Anthium strumarium Linn. Chhota-gokru (H); Ban-okra (B); Agra (A); Ghagra (Sylhet); Parohunta (Mikir).—Loc: Gauhati, Silchar, Barigaon, Shella forest (Assam). A3.

ERICACEAE

Gaultheria fragrantissima Wall. Soh-lyng-thrait (K).—Loc: Shillong, Shillong Peak, Lait-ling-kot, Gorg, Nongbari forest, Khasi Hills, Nangpirur Peak forest, Rifle ranges, Tharia (Assam); Aka Hills (NEFA); Nyumagond, Kameng Divn. (NEFA); Lachen, Lachung Changu (Sikkim). A2.

MYSRINACEAE

Embelia ribes Burm. Ju-bim-bim (K); Babarang (H); Birang (B).—Loc: Pynursla, Shongpung, Mamlu forest, Laitlingkot, Mausmai, Jowai forest, above laban in Shillong, Peak forest (Assam). A2.

Maesa indica Wal. (Poisonous plant) Phusera, gogra (H); Nangalbhanga (A); Nok-ling (Mikir-A).—Loc: Barapani, Umran forests, Nongpoh, Sohyngkhan forest, Sirikua, Tikhang, Bhogo, Diroi Reserve Golaghat, Halkota, Mikir Hills, Amugugir, Nambor forest, Silghat, Kachugaon, Chardwar, Kocharigaon, Tharia Rd; Tura forest, Tura top (Garo Hills) (Assam); Lawacherra (Sylhet); Naga Hills, Kohima (NHTA). A3.

EBENACEAE

Diospyres embryopteris Pers. Kendu (A); Makartendi (O).—Loc: Kamrup, Mohandraganj, Garo Hills (Assam); Keonjhar Reserved Forest (Orissa). A2.

Diospyros melanoxylon Roxb. Tendu, Timburni (H).—Loc: Rebna and Keonjhar Reserved forests (Orissa). A2.

OLEACEAE

Jasminum arborescens Roxb. (Essential oil yielding plant) Saptala, Nava-mallika, Bela, Muta-Bela (H); Bura-Kunda (B).—Loc: Parts of Rajmahal Hills, Gayaghat, Santal parganas etc. of Bihar; Kalakandi and other parts of Orissa. A2.

Jasminum caudatum Wall. Essential oil yielding plant) Mei-long-Kait-sree, mei-soh-siang (K).—Loc: Bholaganj, Nonghlaw, Barapani (Assam); Mamulu, Reliang (K & J Hills); Kalioni (Sibsagar); other parts of Assam. A2.

Jasminum pubescens Willd. (Essential oil yielding plant). Duamali (A).—Loc: Lakhimpur, Sibsagar, K & J Hills (Assam) parts of Purnea, Champaran, Santal parganas, etc. (Bihar). A2.

Jasminum sambac Ait. (Essential oil yielding plant) Duamali (A).—Loc: Jeypore, Kamrup, other parts of Assam; Bihar; Bengal; Orissa. A1.

APOCYNACEAE

Holarrhena antidysenterica Wall. Kureya (H); Dudcory (A).—Loc: Patharia forest, Burni forest, Kamrup, Haltugaon (Assam); Naga Hills (NHTA) & Keonjhar and other plain areas (Orissa). A3.

Rauwolfia densiflora Benth. Dieng-ja-soh-Karblong (K).—Loc: Cherra, Punursla, Dawki, Shillong, Nongpoh (Assam). A3.

Rauwolfia serpentina Benth. Sarpagandha (H); Arakhchontita (A).—Loc: Tharia forest, Umsaw, Lowcherra, Sylhet, Kuls, Kamrup, Gourisagar, Sibsagar, Chirang Reserve, Goalpara (Assam). A2.

ASCLEPIADACEAE

Asclepias curassavica Linn. (Poisonous plant). Kakatundi (H).—Loc: Lumding range, Jeypore (Assam); Naga Hills (NHTA); Denning, Morcong, Sella (NEFA). A2.

Tylophora asthmatica W. & A. Antamul (H); Antomula (B); Mendi (O).—Loc: Plain forests of Cachar District (Assam); North Bengal. A2.

LOGANIACEAE

Strychnos nuxvomica Linn. Kuchla (H); Thal kesuria, Kuchilla (B); Makurikab (A).—Loc: Nowgong, Kukrakata Reserve, Silghat, (Assam); Keonjhar forests (Orissa); Jeypore forests (Andhra); forests of Bihar; forests of Bengal A2.

GENTIANACEAE

Swertia chirata Ham. Chirata, Charayateh (H); Chirata (B).—Loc: Lait-lyng-kot, forest Cherra road 31st mile, K & J Hills (Assam); Singhik-chung-Thang area and other lower altitudes of Sikkim. A2

BORAGINACEAE

Heliotropium indicum Linn. (Poisonous Plant) Hati Sura (B); Hatisuria (A).—Loc: Bholaganj, Goalpara, other plain forests of Assam, Bihar, Bengal and Orissa. A3.

CONVOLVULACEAE

Cuscuta reflexa Roxb. Akhabel (H); Haldi-argui rutta (B); Shunyalat (B); Mei-tiw-marwai (K).—Loc: Elephant Falls (near Shillong), 15th mile on Cherra Road, K & J Hills (Assam). A2.

Impomoea hederacea Jacq. Kala-danab (H) and (B).—Loc: Shillong, Sorynghan, K & J Hills (Assam). A2.

SOLANACEAE

Solanum spirale Roxb. Tita Kusi (A).—Loc: Shillong, Khasi Hills, Lyngdoh, Nongphan, K & J Hills Dist. Halkata, Jeypore, Kalioni, Jamuguri, Dikumukh (Assam); Naga Hills (NHTA). A2.

SCROPHULARICEAE

Picrorhiza kurrooa Benth. Kidki (H) and (B); Kudki (N).—Loc: Changu area (Sikkim). A3.

BIGNONIACEAE

Oroxylum indicum Vent. Ullu, Arlu (H); Sona (B); Tokuna (A); Bhatgila (Sylhet).—Loc: Dawki, Nongpoh, Jowai, Jorain, other plains (Assam); forests of southern Tripura; Foot Hills of NEFA. A2.

ACANTHACEAE

Adhatoda vasica Nees. Vasaka (S); Arusha (H); Bakas (B).—Loc: Shillong, Nongpoh, Sibsagar, Lakhimpur (Assam). A3.

Andrographis paniculata Nees. Kirayat (H); Kalmegh (B); Kalamagh (A).—Loc: Nalbari (Assam); Malayagiri Hills, (Orissa); other plain areas of Eastern India. A2.

VERBENACEAE

Clerodendron infortunatum Gaertn. Bhant (H) and (B); Bhetphul (A).—Loc: Dawki, Jirimukh, Jeypore, Batasipur,—Kochugaon, etc. (Assam) A3.

Vitex negundo Linn. Sanbhal (H); Nishinda (B); Pachettia (A).—Loc: Cauhati, Goalpara, Gotong, Chardwar, Phakaill (Assam); other parts of

Stkkim, Bihar and Bengal A2.

Vitex peduncularis Wall. Ahoi, Osai (A); Asai, Rangrea, rangngi (Garo) (A); Boruna, Goda (B).—Loc: Umsaw, Dawki, Nongpoh, Umran, Khasi Hills; Kulsii, Lower Assam, Khalasi block, Samphalgiri, Tura area, Mohendraganj (Assam); Chirang, Garjee and Chandrapur forests (Tripura); Seshayi (Andhra) A3.

CHENOPODIACEAE

Chenopodium ambrosioides Linn. Katu ayamodda (A).—Loc: Shillong, Dawki, near Bynthan village, Nowgong, Upper Shillong, Khasi Hills (Assam). A2.

NEPENTHACEAE

Nepenthes khasiana Hk. f. & T.—Loc: Bagmara and other parts in Garo Hills, Jorain, Langrim, Nonghulam, K & J Hills (Assam). A2.

ROXBURGHIAEAE

Stemona tuberosa Lour. Givi-si-riubi (Mikir) (A); Tassurthak (Daffla).—Loc: Dawki, Barnihat, Moriani, Dyang, Bharali, Babhoy, (Assam); Aka Hills, Pasighat (NEFA). A2.

LILIACEAE

Fritillaria cirrhosa D. Don. Yathu (T) and (Mishmi).—Loc: Dichu valley, Lohit Divn. (NEFA); Changu and Kupup areas (Sikkim). A2.

Fritillaria stracheii Hook. f.—Loc: Selari hills slope, Kameng Dv. (NEFA); Kupup, Gnathang area (Sikkim). A2.

ARACEAE

Arisaema consanguineum Schott. (Poisonous plant).—Loc: Lait-lyng-kot, Elephant Falls, Peak Falls, Sohrarain, Shillong, other parts of K & J Hills, Assam. A3.

Arisaema tortuosum Schott. (Poisonous plant). Kiri-ki-kukri (P).—Loc: Shillong, Nongpoh, Dumpep, Umsaw, Lait-lyng-kot, Peak forest, Sohrarain, Deobaner (K & J Hills, Assam). A2.

GRAMINEAE

Cymbopogon martini (Roxb.) Wats. (Essential oil yielding plant). Reshagrass, Rohisa(S), Gandhbel (H).—Loc: Khasia and Garo Hills (Assam); Naga Hills (NHTA); Parts of Singhboun, Santal Parganas, Chotta Nagpur of Bihar; Angul, Sambhalpur and other parts of orissa. A3.

Vetiveria zizanioides Stapf. (Essential oil yielding plant). Biringa (A).—Loc: Company Ganj, Jaintiapur, Sadiya, Kachugaon, Nongpoh and other plain parts of Assam; parts of Champaran Purnia, Santal, Parganas (Bihar); Puri, Angul, Sambalpur (Orissa). A3.

PIPERACEAE

Piper longum Linn. Pipli (H) and (B); Bithi pokong-arong (Mikir).—Loc: Barnihat, Gumarange; Sylhet Divn; Jeypore Re erve (Assam). A2.

LAURACEAE

Cinnamomum zeylanicum Breyn. (Essential yielding plant). Dalchini (H), (B) and (A).—Loc: Cherrapunjee, Lait-lyng-kot, Jowai, Nortiang and other parts of Khasi Hills (Assam). A3.

THYMELEACEAE

Daphne bhohua Ham ex Don.—(*D. canuabina* Wall).—Loc: Elephant Falls (near Shillong); Lait-lyng-kot, Dumpep, K & J Hills (Assam); Naga Hills (NHTA); different ranges around Chung Thang, Changu, Thangu and Gnathong (Sikkim). A2.

LORANTHACEAE

Viscum articulatum Burm. Pan Pudu (H); Kurchu (N).—Loc: Sohrarain, Lawlynghdoh, Lao-soh, Mynkhar, Nongstein, Peak forest, Nongbri forest, Khasi Hills (Assam); Naga Hills (NHTA); Kangla tunghe (Manipuri); Chung Thang (Sikkim); Dirang-Dzong Valley (NEFA). A2.

SANTALACEAE

Santalum album Linn. (Essential oil yielding plant) Baga Chandan (A); Chandan (B) and (P) Chandal, Sandal (H).—Loc: Umsaw forest, K & J Hills (Assam); Parasnath (Bihar); Midnapur Hills (Bengal); Kalahanadi, Jeypore (Orissa). A3.

EUPHORBIACEAE

Croton tiglium Linn. Konibih (A); Jamalghota (H).—Loc: Makum, Wahlong, Jamguri, Chardwar, etc. (Assam). A2.

Emblica officinalis Gaertn. Amla, Amlika-Aonla

(H); Amla Amlaki (B); Amloki (A).—Loc: North Kamrup, other plain areas (Assam); Plains of Bengal and Orissa. A2.

URTICACEAE

Streblus asper Lour. Saunra (A).—Loc: Kocharigaon, Baguri, Dikhmukh, Phukanoohat, Tezpur, Lakhimpur, Rudrasagar, Tharia forests, Plains of Sylhet (Assam); Tripura forests (NEFA). A3.

GNETACEAE

Ephedra sexatilis Royle var. *sikkimensis* (Stapf) Forin Asmania, Budagur (P).—Loc: Thangu area (Sikkim). A4.

CONIFERAE

Pinus insularis Endl. (Essential oil yielding plant). Saralkath, Tili owe (A); Dingsa (K).—Loc: Shillong, parts of K & J Hills, Lusha hills (Assam); Naga Hills, Manipur. A4.

Pinus wallichiana A. B. Jacks. (Essential oil yielding plant). Tongschii, Lamshing (Bhutan); Raisalla, Chilla (Kumaon).—Loc: Jabrang, Rupa, Rahung, Dirang Dzong, Apanthang, Michuka, Waling (NEFA).

ORCHIDACEAE

Vanda tessellata Hook. f.—Loc: Rebna, Keonjhar, other plain forests of Orissa; plain forests of Assam, Bengal and Bihar. A3.

ZINGIBERACEAE

Curcuma zedoaria Rosc. Kachura (H) and (B); Katri (A).—Loc: Umsaw, Shillong, Dawki, Bholaganj, Bengtol, Haleme Tea Estate, Bansbari (Assam); Aka Hills (NEFA); Naga Hills (NHTA). A3.

DIOSCOREACEAE

Dioscorea deltoidea Wall. Knios, Kriss (P).—Loc: Umsaw, Garampani (Assam). A2.

Dioscorea prazeri Prain & Burkill. Kencheong (Lepcha).—Loc: Kohima, Naga Hills (NHTA); Sikkim; North Bengal. A1.