



Ethnomedicinal composition depends on floristic composition: A case studied in *Sal* forests of Jharkhand

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Abstract

The composition of different medicinal parts of plants for the preparation of ethnomedicine for specific diseases and disorders is gathered by the tribal and forest dwellers in Jharkhand from ambient vegetation of forests or from the floristic diversity. It is very interesting that from a wide range of plant diversity; the selection of plants and preparations of ethnomedicine by making composition over trial on generation to generation is innovation of ethnic people. The floristic composition of *Sal* forests and association of ethnomedicinal plants with *Sal* tree (*Shorea robusta* Gaertn. f.) in different study sites in tribal tracts and their utilization among various ethnic groups like Santhal, Paharia, Oraon, Munda, Kol, Kharwa, Ho etc. have been observed. The tribal people inhabit in the forest areas of Santhal Pargana and Chhotanagpur region of Jharkhand and they collect potential and effective medicinal plants, utilized by them for meeting their primary health care. The species are arranged disease wise giving information with botanical names, tribal names and part used. The medicinal uses of plants species have been recorded from the tribal medicine men *Jangurus*, *Ojhas*, *Manjhis* etc. during the survey and field studies among them. The data will serve as useful tools to understand the dependence of ethnomedicinal composition on floristic composition and importance of natural association of *Sal* forests. It has been observed in the present study that the floristic composition or the plants as natural available in nearby forests has been utilized for the preparations of ethnomedicine by the tribal people which is an evident about dependency of floristic composition for ethnomedicinal composition. The study has also a great relevance to understand the efficacy of specific medicinal plants collected from natural *Sal* forests and the same plants from cultivated or gathered from other than *Sal* forests. There are need of scientific evaluation and validation of the belief and practices of tribal people about the effectiveness of plants collected from *Sal* forests

Key-Words: Floristic composition, Ethnomedicinal composition, *Sal* forests

Introduction

Forests and people of Jharkhand

Since time immemorial, the Jharkhand state being the land of Lord Baidynath; known as natural sanctuary of spiritual, cultural and herbal heritage in India. The state of Jharkhand lies between latitude 22°00' - 24° 37' N and longitude 83° 15'-87° 01' E. and well known due to tribal populations, mineral rich region, tropical dry deciduous forests etc. According to satellite data of Oct.-Dec. 2006, the forests cover is 28.72% of state's geographic area¹. Jharkhand has a tropical climate with annual rainfall of about 900 mm and the temperature varies between 4°C to 47°C. The total population of the state is 26.91 million of which the rural population constituted 77.80% while the schedule tribe constituting 22.50 %.

The tribals, forest dwellers and rural people have a rich oral tradition and native and ethnic knowledge about ambient vegetation and forests. A large number of tribal communities like Santhal, Paharia (Sauria Paharia, Mal Paharia and Kumar Bhag), Oraon, Munda, Kol, Kharwar, Ho, Asur, Baiga etc. are residing in state and having great ethnobotanical –lore. The tribes collect and utilized various herbs, roots, rhizomes, tubers, flowers, fruits, leaves and seeds of many useful plants for meeting their day to day needs and health care from the surrounding forest areas. Santhal is one of the largest tribe and belongs to astro-asiatic race. They are concentrated mainly in Santhal Pargana region along with Paharia tribes. The tribal communities like Munda, Oraon, Kol, Kharwer etc. are concentrated in Chotanagpur plateau. They practice primitive agriculture observing traditional beliefs myths, gathering foods, hunting and fishing. During the

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course of the investigation in the tribal tracts and forest area of Santhal Pargana and Chotanagpur were surveyed and studies with the help of knowledgeable information's and practitioners of ethnomedicine. The aims and objectives of the study was to know the composition of ethnomedicinal plants and their presence in surrounding areas of forests mostly *Sal* and their associated species pertaining to ethnomedicinal plants used by the tribal and rural people of Jharkhand. It was due to based on earlier information's recorded from tribal medicine men that they collect most of the ethnomedicinal plants and plant products from nearby *Sal* tree (*Shorea robusta* Gaertn. f). The data on the utilization of ethnomedicinal plants have been recorded and repeatedly verified among their communities. The medicinal uses of plants are well known by tribal medicine men, *Jangurus*, *Ojhas*, *Manjhis*, *Pahan* etc. who have tradition to see *Tail-patta* means mustard oil polished in leaves of *Sal* tree and diagnoses about diseases and other spiritual problems during the survey and field studies among them. The ethnobotanical studies have also been carried out in these tribal tracts earlier by several workers²⁻²⁵.

Methodology

The plants recorded in the present field studies as association pattern of *Sal* trees have been compared with ethnomedicinal formulations, compositions and preparations prepared and used by the tribals, forest dwellers and rural people of Jharkhand as recorded in random studies of association pattern of *Sal* trees in Baghraidih (Dumka) of Santhal Pargana and Chutupalu Ghati (Ranchi- Ramgarh way) in Chhotanagpur plateau which are approachable by local and tribal people. The analysis on association patterns of *Sal* trees have been carried out by the help of ground level check of flora studied with fifteen quadrats of 12m x 12m size based on species area curve methods in study sites and occurring plants have been recorded followed with standard ecological works²⁶. The plants have been documented occurs in the above quadrats and enumerated.

Results and Discussion

An account of about 169 species (Table-1) has been recorded as associated species of *Sal* trees having potential ethnomedicinal uses among different ethnic community, forest dwellers and rural people of Jharkhand. The tribal medicine men, *Janguru*, *Ojha*, *Manjhi* etc. prepare, paste, pills, powder, decoction, aqueous extract, ointment etc. for treating their diseases and disorders from single plant or in combination with different plant species. The species are arranged under different disease and disorders giving information on

scientific names, local names, tribes and parts used. The abbreviation used for tribes Santhal, SP-Sauria Paharia, MP-Mal Paharia, M-Munda, Or-Oraon, K-Kol, Kw-Kharawar and their plant names enumerated under bracket. The botanical names of the plant have been provided with their author citation. The basionym is not given due to avoid of double citation.

Enumeration of ethnomedicinal plants used as composition in various diseases and disorders and associated with *Sal* Tree:

Antidote: (scorpion sting, snake bite, insects bite) - *Achyranthes aspera* L. (S-Chipchirit; SP - Alirpo; M-Sitirkad; Or-Chirchiti; K-Chirchiri) –root.; *Aristolochia indica* L. (S-Jhunkagod) – root; *Azadirachta indica* Juss. (S- Nib) – leaf. ; *Butea monosperma* Taub. (M-Murud) - bark.; *Calotropis gigantea* Br. (SP-Barangobali)-latex.; *Clitoria ternatea* L. (S-Ruhutuhu) – root.; *Curculigo orchioides* Gaertn. (S-Turum Sanga)-root; *Cynodon dactylon* Pers. (S-Dubi Ghasi) whole plant.; *Cyperus kyllinga* Endl. (S, M-Nirbisi) – rhizome.; *Fimbristylis spathacea* Roth. (K, Kw- Hathia Motha) – root.; *Gloriosa superba* L. (S-Sini-samanom) –rhizome.; *Heliotropium indicum* L. (S- Kidirkatkom) – root.; *Lygodium flexuosum* (S-Badgochak,MP-Mahadebjata) – rhizome, root.; *Moringa oleifera* Lam. (S-Munga arak) –root.; *Murraya koenigii* Spr.(M-Karisakam)-root.; *Rauvolfia serpentina* Benth. ex Kurz. (SP-Chandogod) –root.; *Tamarindus indica* L. (M,S- Jojo) –seed.

Apetite: *Croton oblongifolius* Roxb. (MP-Putol, S-Guti, K-Gruti) – leaf.; *Leucas cephalotes* Spr. (MP – Guma)-root.; *Solanum nigrum* L. (M-Burudiang) – root.

Blood purifier: *Abutilon indicum* Sweet. (S-Mirubaha) – root.; *Achyranthes aspera* L. (Chirchiri) – root.; *Andrographis paniculata* Wall. (S- Kalmegh) – whole plant.; *Hyptis suaveolens* Poit.(MP-Purudo) – root.; *Moringa oleifera* Lam. (MP-Sojana)- bark.; *Sphaeranthus indicus* L. (S-Belaunja) – bark.

Bodyache : *Alstonia scholaris* R.Br. (SP- Chatiare) – bark.; *Canscora decussata* Schult. (S-Sankhahuli)- whole plant.; *Capparis zeylanica* L. (M-Mari janum) – root; *Cleome viscosa* L. (S- Setakata) – whole plant.; *Holoptelea integrifolia* Planch.(S-Chodra) – bark.; *Marsilea minuta* L. (S-Sunsuni arak)- whole plant.; *Oroxylum indicum* Vent. (Kw-Sonpatta) – bark.; *Vitex negundo* L. (M-Sindure) – leaf.

Constipation: *Aegle marmelos* Corr. (S-Sinjudare) – fruit.; *Cassia fistula* L. (M-Bandarlari), *Holarrhena antidysenterica* DC. (MP- Koraiya) – root.; *Soymida febrifuga* Juss. (M-Ruhin) – bark.; *Terminalia chebula* Retz. (Kw-Harra) – fruit.

Cough, cold and asthma: *Achyranthes aspera* L. (Chirchiri) – root.; *Adhatoda zeylanica* Medic. (S, M-Bakosdog) – leaf.; *Ailanthus excelsa* Roxb. (M-Sadom koronjo) – bark.; *Alstonia scholaris* R.Br. (S-Chatnidare) – bark.; *Alternanthera sessilis* R.Br.ex. DC.(M,S-Garundi arak)-whole plant.; *Aristolochia indica* L. (M-Nanrinagbail) – root.; *Calotropis gigantea* Dryand (S-Akaona) – flower.; *Hymenodictyon excelsum* Wall. (MP-Bhorkond) – bark.; *Moringa oleifera* Lam (K, Kw-Sojna) – bark.; *Ocimum basilicum* L.(Tulsi) – leaf.; *Ocimum sanctum* L.(Tulsi) – leaf.

Cuts, boil and wounds: *Agave cantala* Roxb. (SP-Chikkuri) – leaf.; *Ageratum conyzoides* L. (S-Bhusri ghas) – leaf.; *Alocasia indica* Koch. (S-Mankanda) – tuber.; *Bambusa arundinacea* Roxb. (S-Bans) – root.; *Biophytum sensitivum* DC. (S-Jhapni arak) – leaf.; *Blumea lacera* DC.(S-Kukurudaru, M-Marang kuru) – leaf.; *Cassine glauca* Kuntze. (S-Niuri) – bark.; *Cyperus kyllinga* Endl. (S,M-Nirbisi) – rhizome.; *Drimia indica* Juss. (S-Bonpiyaj) – bulb.; *Euphorbia hirta* L. (K-Pusitoa) – whole plant.; *Evolvulus alsinoides* L. (MP-Chatpatia) – whole plant.; *Glossogyne bidens* Alston (S-Bishaynandi, S-Berengobali) – whole plant.; *Heliotropium indicum* L.(S-Kidirkatkom) – root.; *Hyptis suaveolens* Poit (S-Purudo) – Leaf.; *Indigofera linifolia* Retz. (M-Besra tasad) – leaf.; *Leonotis nepetaefolia* R.Br. (Or-Agia) – root.; *Lygodium flexuosum* Sw. (M.Horobho) – rhizome, root.; *Ochna obtusata* DC. (S-Champabaha) – bark.; *Opuntia elatior* Mull. (MP-Nagphani) – Phyllode.; *Oxalis corniculata* L. (M-Jojoara, S-Tandichetomara) – leaf.; *Polygonum glabrum* Willd. (MP-Marich) –leaf.; *Tephrosia Purpurea* Pers. (K, Kw-Banliwa) -leaf

Diarrohoea & dysentery: *Bombax ceiba* L. (MP-Semal) – bark.; *Butea monosperma* Taub. (K-Palas) – bark.; *Croton oblongifolius* Roxb. (M-Kuti) – root.; *Euphorbia hirta* L.(K-Dudhi Lota) – whole plant.; *Gardenia turgida* Roxb. (S-Dundukuit) – bark.; *Holarrhena antidysenterica* DC (K-Koraiya) – root.; *Mangifera indica* L. (MP-Am) – leaf.; *Spondias pinnata* Kurz. (MP-Amra) – bark.; *Syzygium cumini* Skeels (K-Jamun) – bark.

Earache: *Amorphophallus paeoniifolius* Nicol (S-Atopinde) – corm.; *Calotropis gigantea* Dryand. (SP-Barangobali) – latex.; *Oroxylum indicum* Vent. (Kw-Sonpatta, S- Banahatak); *Ventilago denticulata* Willd. (M-Bonga Sarjom) – twig.

Easy delivery: *Achyranthes aspera* L. (S-Chipchirit; SP - Alirpo; M-Sitirkad; Or-Chirchiti; K-Chirchiri) – whole plant

Epilepsy: *Acorus calamus* L. (S,SP, M-Boch)-root.; *Asparagus racemosus* Willd. (S-Kedarnari, SP-Merompalo) – root.; *Calatropis gigantea* Dryand. (S-Akaona) –root.; *Cassine glauca* Ktze (K-Miri, S-Niuri) – bark.; *Centella asiatica* Urban. (S-Rote-ara) – whole plant.; *Cissampelos pareira* L. (S-Tejomala, SP-Karak mandardu) – leaf.; *Colebrookia oppositifolia* Sm. (S-Bhainsa) – root.; *Cyperus scariosus* R.Br.(Nagarmotha) – tuber.; *Nelumbo nucifera* Gaertn. (Kamal) – rhizome.; *Oroxylum indicum* Vent. (SP-Rodo) – bark.; *Polygala arvensis* Willd. (S-Gaighura) – whole plant.; *Selaginella bryopteris* Bak. (MP-Hathajori) – whole plant.; *Stereospermum chelonoides* DC. (S-Pader) – fruit.; *Vanda roxburghii* R. Br. (S-Darebanki) – whole plant.

Fever : *Acacia farnesiana* Willd. (S-Gabur) – bark.; *Andrographis paniculata* Wall. ex Nees (SP-Mahamaga) – root.; *Barleria priontis* L. (S-Railabaha) – root.; *Caesalpinia bonduc* Roxb. (M-Kath-karaj, Janum Karnjo) – seed.; *Canscora decussata* Schult. (M-Urilijum) – whole plant.; *Cissampelos pereira* L. (S-Tejomala) – root.; *Cyperus rotundus* L. (M-Pirijimtu) – tuber.; *Cyperus scariosus* R.Br. (MP-Nagarmotha) – tuber.; *Gmelina arborea* Roxb. (K-Kasmar) – bark.; *Helicteres isora* L. (S-Aintha, Petchamra) – fruit.; *Hemidesmus indicus* R.Br. (S-Motadudhi) – root.; *Hymenodictyon excelsum* Wall. (S-Bhorkond) – bark.; *Ichnocarpus frutescens* R.Br. (M-Huring onolsings) – root.; *Limnophila gratioloides* R.Br. (S-Hemcha arak) – aerial parts.; *Ludwigia octovalvis* Raven (S-Da-ichak) – whole plant.; *Marsdenia tenacissima* Moon. (S-Konget) – root.; *Nyctanthes arbor-tristis* L. (S-Saparom) – leaf.; *Soymida febrifuga* Juss.(S-Ruhin) – bark.; *Vetiveria zizanioides* Nash. (MP-Birna) – root.; *Vitex peduncularis* Wall. (S, M- Charaigorwa, Minjurgorwa, SP-Kerkedo) – leaf, bark and root.

Fertility: *Diplocyclos palmatus* Jaff. (Sivlingi) – seed.; *Mimosa pudica* L. (SP-Lajkuri, S-Jhapniarak) – seed.

Filaria : *Caesalpinia bonduc* Roxb. (M-Janum Koronjo) – leaf.; *Hemidesmus indicus* R.Br (S-Motadudhi) – root.; *Sida rhombifolia* L. (M-Ipirpiung) – root.; *Typhonium trilobatum* Schott. (S-Nirbisi) – tuber.

Fistula: *Cassia fistula* L. (SP- Sonali) – leaf.; *Ficus benghalensis* L. (S-Bor) – stilt root bark.; *Holarrhena antidysenterica* DC. (MP- Koraiya) – latex.; *Sphaeranthus indicus* L. (M-Kardani tasad) – whole plant.; *Terminalia arjuna* Wight & Arn. (Kw-Kahua) – bark.

Gastric disorder: *Abutilon indicum* Sw. (S-Miruabaha) – root.; *Alstonia scholaris* R.Br. (SP-Chatiaara) – bark.; *Andrographis paniculata* Wall. ex Nees (S-Kalmegh) – whole plant.; *Aristolochia indica* L. (M-Nanri-nagbail) – root.; *Cissampelos pariera* L. (S-Tejomala) – root.; *Croton oblongifolius* Roxb. (S-Guti, K-Kuti) – root.; *Dioscorea bulbifera* L. (S-Bengo nanri) – tuber.; *Holarrhena antidysenterica* DC. (Kw-Koraiya) – bark, root.; *Rauvolfia serpentina* Benth. ex Kurz (Or-Nag bail) – root.; *Solanum nigrum* L. (M-Burudiana) – root.

Gonorrhoea: *Aloe vera* Burm.f. (S-Mosobar) – leaf.; *Celastrus paniculatus* Willd. (S-Kujri) – root.; *Ficus benghalensis* L. (S-Bor) – latex.; *Hibiscus cancellatus* (Or-Bir-kaskom) – root.; *Thespesia lampas* Dalz. & Gibs. (SP-Duro, S-Bankapsi) – root.

Hydrocele: *Elephantopus scaber* L. (S-Minzur Jhuti) – root.; *Indigofera linifolia* Retz. (S-Tandi khode) – whole plant

Intestinal worms: *Alstonia scholaris* R.Br. (S-Chatni) – bark.; *Amaranthus spinosus* L. (S-Janum arak, Or-Acch adro) – root.; *Annona squamosa* L. (S-Mandargom, SP-Chagio sarifa) – seed.; *Argemone mexicana* L. (M-Bakula Janum) – seed.; *Aristolochia indica* L. (M-Nanri Nagbail) – bark.; *Butea monosperma* Taub. (S-Murup, M-Murud) – latex.; *Holarrhena antidysenterica* DC. (MP-Koriya) – root.; *Mallotus philippinensis* Muell.-Arg. (Kw-Rori) – fruit.; *Moringa oleifera* Lam. (K-Sahajan) – bark, stem.; *Vitex negundo* L. (S-Sindure) – leaf.

Jaundice: *Aegle marmelos* Corr. (MP-Bel) – leaf.; *Antidesma acidum* Retz. (S-Matha arak, SP-Tisso) bark.; *Boerhavia diffusa* L. (S-Ohoic-arak, Naklo- adro) – whole plant.; *Centella asiatica* Urban (S-Rote-arak) – whole plant.; *Cucurbita lagineria* L. (MP-Jhinga); *Leucas cephalotes* Spreng. (MP-Guma) – whole plant.; *Phyllanthus fraternus* Webst. (MP-Bhuianwla) – whole plant.; *Scoparia dulcis* L. (S-Chini Skam) – leaf.

Leucoderma: *Abrus precatorius* L. (S-Kawet) – leaf.; *Aerva lanata* Juss. (S-Lopong arak, SP-Puput) – root.; *Acacia catechu* Willd. (MP-Khaira) – heart wood.; *Celastrus paniculatus* Willd. (SP-Jargurso) – seed. *Derris indica* Bennet. (Kw-Karanj) – oil.; *Plumbago zeylanica* L. (MP-Chitrok) – root.

Leucorrhoea: *Aerva lanata* Juss. (S-Lopong arak) – whole plant.; *Bauhinia variegata* L. (S-Jhinjhit) – flower.; *Butea monosperma* Taub. (S-Murup) – whole plant.; *Clitoria ternatea* L. (M-Saankba, S-Ruhutuhu) – root.; *Emblica officinalis* Gaertn. (K-Anula) – bark.; *Mallotus philippensis* Muell.-Arg. (S-Rora) – root.; *Pterospermum acerifolium* Willd. (M-Mackkunda) – bark.; *Saccharum spontaneum* L. (K-Kasi) – root.

Scoparia dulcis L. (M-Chinibuti) – whole plant.; *Smilax ovalifolia* Roxb. (M-Atkir), *Soymida febrifuga* Juss. (S-Ruhin). Stem bark.; *Vetiveria zizanioides* Nash (Kw-Khas) – root.; *Woodfordia fruticosa* Kurz (M-Icha baha) – flower.

Leprosy: *Alstonia scholaris* R.Br. (K-Chatni) – bark.; *Azadirachta indica* A. Juss. (Kw-Neem) – leaf.; *Centella asiatica* Urban (S-Rote arak) – whole plant.; *Psoralea corylifolia* L. (MP-Barkuchi) – seed.

Menstrual disorder: *Aerva lanata* Juss. (S-Lopong- arak) – root.; *Curculigo orchoides* Gaertn. (M-Turum sanga) – tuber.; *Cynodon dactylon* Pers. (S-Dubi) – whole plant.; *Ficus benghalensis* L. (M-Bari) – fruit.; *Gossipium herbaceum* L. (Or-Kapas) – root.; *Scoparia dulcis* L. (S-Chinisakam) – whole plant.; *Soymida febrifuga* A.Juss. (M-Ruhin) – stem bark.

Paralysis: *Abrus precatorius* L. (M-Kead) – root.; *Alangium salvifolium* Wang. (S-Dela) fruit.; *Alstonia scholaris* R. Br. (K-Chatni) – bark.; *Barleria cristata* L. (S-Raila baha) – root.; *Cassia tora* L. (Kw-Chakora) – root.; *Celastrus paniculatus* Willd. (M-Kujri) – seed.; *Cryptolepis buchanani* Roem &Schultz. (S-Utridudhi) – root.; *Cuscuta reflexa* Roxb. (K-Aaamarbel) – whole plant.; *Hemidesmus indicus* R.Br. (S-Motadhudhi) – root.; *Ichnocarpus frutescens* R.Br. (M-Huring onolsing) – root.; *Moringa oleifera* Lam. (K-Sahijan) – root.; *Mucuna pruriens* DC.(M-Etka) – root.; *Symplocos racemosa* Roxb. (M-Ludamba) – bark.

Polio: *Cassia fistula* (M-Bandarauri) – root.; *Cuscuta reflexa* Roxb. (K-Amrbel) – whole plant.; *Helicteres isora* L.(S-Petchamra) – fruit.; *Ichnocarpus frutescens* R.Br. (Huring onolsing) – root.; *Moringa oleifera* Lam. (S-Munga arak) – root.

Potency: *Asparagus racemosus* Willd. (S-Kedar - nari) – tuber.; *Curculigo orchoides* Gaertn. (SP-Ertalmi) – tuber.; *Ficus benghalensis* L. (S-Bore) – latex.; *Ficus racemosa* L. (Kw-Gular) – ripe fruit.; *Mucuna pruriens* DC. (Kw-Kawanch) – seed.; *Pueraria tuberosa* DC. (MP-Patalkohra) – tuber.; *Tamarindus indica* L. (K-Imli) – seed.

Pox: *Bombax ceiba* L. (M-Edel -dare) – prickles on trunk.; *Drypetes roxburghii* Hurus (S-Pitong) – seed.; *Moringa oleifera* Lam. (K-Sahijan) – bark.

Rheumatism: *Abrus precatorius* L. (M-Kawet) – root.; *Achyranthes aspera* L. (Kw-Chirchiti) – root.; *Aristolochia indica* L. (S-Jhunka-god) – root.; *Bauhinia purpurea* L. (SP-Komo) – bark.; *Celastrus paniculatus* Willd. (M-Kujri) – root.; *Cuscuta reflexa* Roxb. (Kw-Alagjari) – whole plant.; *Hemidesmus indicus* R.Br. (S-Mota Dudhi) – root.; *Ichnocarpus frutescens* R. Br. (S-Nanka dudhi) – root.; *Marsdenia tenacissima* Moon. (S-Kongat) – root

bark.; *Moringa oleifera* Lam. (K-Sahijan) – root.; *Oroxylum indicum* Vent. (Kw-Sonpatta) – bark.; *Orthosiphon rubicundus* Benth. (S-Barhalehri) – root.; *Mucuna pruriens* DC. (M-Etke) – root.; *Vitex negundo* L. (S-Sindure) – root.

Skin disease: *Abrus precatorius* L. (S-Kawet) – seed.; *Adiantum caudatum* L. (MP-Dodhari) – whole plant.; *Adiantum philippense* L. (MP-Dewarjhar) – whole plant.; *Aloe vera* Burm.f. (S-Mosobar) – leaf.; *Alternanthera sessilis* R.Br. ex DC. (M-Garundi arak) – whole plant.; *Anogeissus latifolia* Wall.ex. Bedd. (K-Hesel) – bark.; *Azadirachta indica* A. Juss. (M-Neem) – seed oil, leaf.; *Borassus flabellifer* L. (M-Tardaru) – inflorescence.; *Butea monosperma* Taub. (K-Paras) – seed.; *Cassia tora* L. (Kw-Chakora) – seed.; *Cuscuta reflexa* Roxb. (Kw- Alagjary) – whole plant.; *Deris indica* Bennet. (M-Koronjo) – seed.; *Hyptis suaveolens* Poit (MP- Purudo) – leaf.; *Leonitis nepetaefolia* R.Br. (M Agia) – inflorescence.; *Lepidagathis hamiltonia* Wall. (M-Aote agia) – flower, fruit.; *Nerium odorum* Soland (M-Kanail) – root.; *Panicum repens* L. (S-Adagathia) – culm.; *Pygmaeopremna herbacea* Mold. (K-Gathiabat) root.; *Tragia involucrata* L. (M-Sengel sing) – root.; *Tridax procumbens* (MP-Kharha ghas) – whole plant.; *Woodfordia fruticosa* Kurz (M-Ichabaha) – flower.

Spermatorrhoea: *Asparagus racemosus* Willd. (SP-Mermopalo) – tuber.; *Bombax ceiba* L. (M-Edeldare) – tuber.; *Buchnanania lanzan* Spreng. (S-Tarop) – seed.; *Euphorbia hirta* L.(K-Pusitoa) – whole plant.; *Ficus benghalensis* L. (S-Bare) – latex.; *Ficus racemosa* L. (K-Loa) – bark.; *Gossipium arboreum* L. (M-Kasmar) – root.; *Hygrophila auriculata* Heine (M-Gada bakula) – seed.; *Mucuna pruriens* DC.(M-Etka) – seed.; *Pueraria tuberosa* DC. (Kw-Madukam ara) – fruit.; *Scoparia dulcis* L. (S-Chinisakam) – whole plant.

Syphilis: *Argemone mexicana* L. (S-Atkuti) – root.; *Costus speciosus* Sm. (S-Orop) – tuber.; *Curuma longa* L. (S- Sasang) – rhizome.; *Smilax macrophylla* Roxb. (M-Atkir) – root.; *Smilax perfoliata* Lour. (MP –Raepan) – root.; *Syzygium cumini* Skeels (K-Jamun) – stem bark.; *Terminalia chebula* Retz. (S-Roi) – fruit.

Toothache: *Acacia nilotica* Willd. (S –Babla) – twig.; *Achyranthes aspera* L. (Kw-Chirchiti) – root.; *Artocarpus lakoocha* Roxb. (Dahu) – latex.; *Holarrhena antidysenterica* DC. (K-Koraiya) – root bark.; *Jatropha curcas* L. MP- Bherenda) – twig, stem bark.; *Solanum surattense* Burm. f. (MP-Katraingnee) – seed.

Tuberculosis: *Adhatoda zeylanica* Medic. (S-Bakosdog) – leaf.; *Artocarpus heterophyllus* Lam. (Kathal) – fruit.; *Celestrus paniculatus* Willd. (M-Kujri) – seed.; *Cyperus kyllinga* Endl. (S-Nirbisi) – rhizome.; *Ficus racemosa* L. (MP- Gular) – root, fruit.; *Madhuca longifolia* Macbride (K-Mahua) – flower.; *Pueraria tuberosa* DC. (S-Patal kohra) – tuber.; *Saccharum spontaneum* L. (MP-Kush) – root.; *Semecarpus anacardium* L. f. (S-Soso) – seed.

Urinary trouble: *Abelmoschus esculentus* Moench. (S-Ramjnga) – root.; *Aerva lanata* Juss. (S- Lopong arak) – seed, flower.; *Asparagus racemosus* Willd. (S-Merompalo) – root.; *Boerhavia diffusa* L. (S-Ohoic- arak, Naklo adro) – whole plant.; *Cissampelos pareira* L. (S-Tejomala) – root.; *Curcuma angustifolia* Roxb. (MP-Tikhur) – rhizome.; *Cynodon dactylon* L. Pers. (S-Dubi) – whole plant.; *Cyperus rotundus* L.(MP-Motha) – root.; *Dolichos biflorus* L. (MP-Kurthi) – seed.; *Ficus religiosa* (K-Pipal) – bark.; *Ficus virens* Aiton. (S-Pakre) – bark.; *Leucas cephalotes* Spreng. (MP-Guma) – whole plant.; *Vetiveria zizanioides* Nash (MP- Khas, Birna) – root.

Conservation of *Sal* forests and preservation of valuable medicinal plants

In the present study it is very much clear that the *Sal* tree is one of the main components of forests of Jharkhand which have association with a large number of potential ethnomedicinal plants most useful for the treatment of various diseases and disorder practiced by the ethnic and rural people and forest dwellers. It is most important to conserve the *Sal* forests in Jharkhand because of most of the associated species used for the formulations and composition of ethnomedicinal recipes. It has been also observed that there are considerable loss of medicinal plant diversity in Santhal Pargana and Chotanagpur of Jharkhand are mainly due to depletion of *Sal* jungles, excessive exploitation of medicinal and economic plants, felling of forests for timber and firewood, construction of roads and highways and loss of natural habitats etc. The tribal and rural people understand the need of conservation and consequences of over exploitation of forest resources. They place taboos on certain *Sal* tree species and the tree use to devote the ethnic god for worship and never harm them. They believe in super natural powers and myths relating to surrounding vegetation of *Sal* trees. They worship several plants and avoid their collection even as firewood. They also avoid collecting immature underground parts of certain species and always leave of propagating materials to ensure regeneration in the next season. They never pluck all the flowers and fruits from the single plants.

Such practices often lead to conservation, preservation and wise management of biodiversity. It is an important fact that considering the dependency of tribal upon forest, the Government of India Forests and Tribal Review Committee in 1982 observed that forest not only provide food, medicinal plants, fodder and fuel to the tribal but also satisfy their deep rooted sentiments²⁷⁻²⁸. The study has also a great relevance to understand the efficacy of specific medicinal plants collected from natural *Sal* forests and the same plants from cultivated or gathered from other than *Sal* forests. The belief of tribal people about the effectiveness of plants collected from *Sal* forests will verify and hence, there are need of scientific evaluation and validation. The study revealed that there are obviously the floristic compositions are directly related with ethnomedicinal composition due to their availability. There is enormous ethnomedicinal plants diversity in the *Sal* forest areas of Santhal Pargana and Chotanagpur plateau is widely utilized for ethnomedicinal formulations. The proper and wise management for protection and preservation of biodiversity of *Sal* forests will certainly may save and conserve the vanishing medicinal plant wealth which can be effectively achieved by involving local people and tribals. The effectiveness of medicinal plants occurs in association of *Sal* tree should be evaluated for chemical and pharmaceutical bioprospecting. The wealth of medicinal plant of *Sal* forests needed for establishment herbal drugs collection and processing center for formulation of effective and safe herbal medicines, based on the ethnotherapeutics practices by the tribals. The data on ethnomedicinal plants will serve as useful tools to prepare development and action plant for policy makers to understand the importance of *Sal* trees and making plan to their conservation. The loss of *Sal* trees and forest may directly effects the loss of valuable natural occurring ethnomedicinal plants and hence the loss of cultural heritage of ethnoherbology and depletion of plant is the major factors of loss of ethnic knowledge²⁹⁻³⁰. The above study is an example to understand ethnomedicinal composition selected from the floristic composition as occurs from ambient vegetation and flora. The study in *Sal* forests revealed that the association pattern and their floristic composition is a versatile tools for ethnic people of Jharkhand to innovate their medicinal uses in primary healthcare for the treatment of various diseases and disorders. The further studies on any variations in phytochemical constituents and efficacy on same medicinal plants collected from *Sal* forests and a comparative study on the plants other than *Sal* forests would be a very interesting for scientists.

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Table 1: Enumeration of plants occurs in study areas of Sal forests of Jharkhand

S/No.	Botanical Name	Family	Habit
1.	<i>Abelmoschus esculentus</i>	Malvaceae	Herb
2.	<i>Abrus precatorius</i>	Fabaceae	Twining shrub
3.	<i>Abutilon indicum</i>	Malvaceae	Shrub
4.	<i>Acacia farnesiana</i>	Mimosaceae	Small tree
5.	<i>A. catechu</i>	Mimosaceae	Small tree
6.	<i>A. nilotica</i>	Mimosaceae	Small tree
7.	<i>Achyranthes aspera</i>	Amaranthaceae	Under shrub
8.	<i>Acorus calamus</i>	Araceae	Herb
9.	<i>Adhatoda zeylanica</i>	Acanthaceae	Shrub
10.	<i>Adiantum caudatum</i>	Adiantaceae	Fern
11.	<i>Adiantum philippense</i>	Adiantaceae	Fern
12.	<i>Aegle marmelos</i>	Rutaceae	Tree
13.	<i>Aerva lanata</i>	Amaranthaceae	Under shrub
14.	<i>Agave cantala</i>	Agavaceae	Stout shrub
15.	<i>Ageratum conyzoides</i>	Asteraceae	Herb
16.	<i>Ailanthus excelsa</i>	Simaroubaceae	Tree
17.	<i>Alangium salvifolium</i>	Alangiaceae	Tree
18.	<i>Alocasia indica</i>	Araceae	Herb

19.	<i>Aloe vera</i>	Liliaceae	Herb
20.	<i>Alstonia scholaris</i>	Apocynaceae	Small tree
21.	<i>Alternanthera sessilis</i>	Amaranthaceae	Prostrate herb
23.	<i>Amaranthus spinosus</i>	Amaranthaceae	Spinosus herb
24.	<i>Amorphophallus paeoniifolius</i>	Araceae	Stout herb
25.	<i>Andrographis paniculata</i>	Acanthaceae	Herb
26.	<i>Annona squamosa</i>	Annonaceae	Small tree
27.	<i>Anogeissus latifolia</i>	Combretaceae	Tree
28.	<i>Antidesma acidum</i>	Euphorbiaceae	Shrub
29.	<i>Argemone mexicana</i>	Papaveraceae	Herb
30.	<i>Aristolochia indica</i>	Aristolochiaceae	Twiner
31.	<i>Artocarpus lakoocha</i>	Moraceae	Tree
32.	<i>Asparagus racemosus</i>	Liliaceae	Climber
33.	<i>Azadirachta indica</i>	Meliaceae	Tree
34.	<i>Bambusa arundinacea</i>	Poaceae	Bamboo
35.	<i>Barleria cristata</i>	Acanthaceae	Under shrub
36.	<i>B. priontis</i>	Acanthaceae	Under shrub
38.	<i>Bauhinia purpurea</i>	Caesalpinaceae	Small tree
39.	<i>B. variegata</i>	Caesalpinaceae	Small tree
40.	<i>Biophytum sensitivum</i>	Oxalidaceae	Little herb
41.	<i>Blumea lacera</i>	Asteraceae	Small herb
42.	<i>Boerhavia diffusa</i>	Nyctaginaceae	Herb
43.	<i>Bombax ceiba</i>	Bombacaceae	Tree
44.	<i>Borassus flabellifer</i>	Arecaceae	Palm
45.	<i>Buchnanania lanzan</i>	Anacardiaceae	Tree
46.	<i>Butea monosperma</i>	Papilionaceae	Tree
47.	<i>Caesalpinia bonduc</i>	Caesalpinaceae	Tree
48.	<i>Calatropis gigantea</i>	Asclepiadaceae	Shrub
49.	<i>Canscora decussate</i>	Gentianaceae	Herb
50.	<i>Capparis zeylanica</i>	Capparidaceae	Shrub
51.	<i>Cassia fistula</i>	Caesalpinaceae	Tree
52.	<i>C. tora</i>	Caesalpinaceae	Herb
53.	<i>Cassine glauca</i>	Celastraceae	Small tree
54.	<i>Celastrus paniculatus</i>	Celastraceae	Climbing shrub
55.	<i>Centella asiatica</i>	Apiaceae	Creeping herb
56.	<i>Cissampelos pareira</i>	Menispermaceae	Climber
57.	<i>Clitoria ternatea</i>	Fabaceae	Climber
58.	<i>Colebrookia oppositifolia</i>	Lamiaceae	Shrub
59.	<i>Costus speciosus</i>	Costaceae	Tuberous herb
60.	<i>Croton oblongifolius</i>	Euphorbiaceae	Tree
61.	<i>Cryptolepis buechanani</i>	Asclepiadaceae	Twinning shrub
62.	<i>Cucurbita lagineria</i>	Cucurbitaceae	Climber
63.	<i>Curculigo orchoides</i>	Hypoxidaceae	Herb
64.	<i>Curcuma angustifolia</i>	Zingiberaceae	Herb
65.	<i>Curuma longa</i>	Zingiberaceae	Herb
66.	<i>Cuscuta reflexa</i>	Cuscutaceae	Parasite
67.	<i>Cynodon dactylon</i>	Poaceae	Creeping grass
68.	<i>Cyperus rotundus</i>	Cyperaceae	Grass herb
69.	<i>C. kyllinga</i>	Cyperaceae	Grass herb
70.	<i>C. scariosus</i>	Cyperaceae	Grass herb
71.	<i>Derris indica</i>	Fabaceae	Tree

72..	<i>Dioscorea bulbifera</i>	Dioscoreaceae	Bulbilous herb
73.	<i>Diplocyclos palmatus</i>	Cucurbitaceae	Climber
74.	<i>Dolichos biflorus</i>	Fabaceae	Herb
75.	<i>Drimia indica</i>	Liliaceae	Bulbous herb
76.	<i>Drypetes roxburghii</i>	Euphorbiaceae	Tree
77.	<i>Elephantopus scaber</i>	Asteraceae	Herb
78.	<i>Emblica officinalis</i>	Euphorbiaceae	Small tree
79.	<i>Euphorbia hirta</i>	Euphorbiaceae	Herb
80.	<i>Evolvulus alsinoides</i>	Convolvulaceae	Herb
81.	<i>Ficus benghalensis</i>	Moraceae	Tree
82.	<i>Ficus racemosa</i>	Moraceae	Tree
83.	<i>F. religiosa</i>	Moraceae	Tree
85.	<i>F. virens</i>	Moraceae	Tree
86.	<i>Fimbristylis spathacea</i>	Cyperaceae	Herb
87.	<i>Gardenia turgida</i>	Rubiaceae	Tree
88.	<i>Gloriosa superba</i>	Liliaceae	Shrub
89.	<i>Glossogyne bidens</i>	Asteraceae	Herb
90.	<i>Gmelina arborea</i>	Verbenaceae	Tree
91.	<i>Gossypium arboreum</i>	Malvaceae	Tree
92.	<i>G. herbaceum</i>	Malvaceae	Tree
93.	<i>Gymnema sylvestre</i>	Asclepiadaceae	Climber
94.	<i>Helicteres isora</i>	Sterculiaceae	Shrub
95.	<i>Heliotropium indicum</i>	Boraginaceae	Herb
96.	<i>Hemidesmus indicus</i>	Asclepiadaceae	Twinning shrub
97.	<i>Hibiscus cancellatus</i>	Malvaceae	Herb
98.	<i>Holarrhena antidysenterica</i>	Apocynaceae	Small tree
99.	<i>Holoptelea integrifolia</i>	Ulmaceae	Tree
100.	<i>Hymenictylon excelsum</i>	Rubiaceae	Tree
101.	<i>Hyptis suaveolens</i>	Lamiaceae	Herb
102.	<i>Ichnocarpus frutescens</i>	Apocynaceae	Climbing shrub
103.	<i>Indigofera linifolia</i>	Fabaceae	Prostrate herb
104.	<i>Jatropha curcas</i>	Euphorbiaceae	Shrub
105.	<i>Leonotis nepetaifolia</i>	Lamiaceae	Tall herb
106.	<i>Lepidagathis hamiltonia</i>	Acanthaceae	Herb
107.	<i>Leucas cephalotes</i>	Lamiaceae	Herb
108.	<i>Limnophila gratioloides</i>	Scrophulariaceae	Herb
109.	<i>Ludwigia octovalvis</i>	Onagraceae	Tree
110.	<i>Lygodium flexuosum</i>	Lygodiaceae	Climbing Fern
111.	<i>Madhuca longifolia</i>	Sapotaceae	Tree
112.	<i>Mallotus philippinensis</i>	Euphorbiaceae	Tree
114.	<i>Marsdenia tenacissima</i>	Asclepiadaceae	Twiner
115.	<i>Marsilea minuta</i>	Marsiliaceae	Herb
116.	<i>Mimosa pudica</i>	Mimosaceae	Under shrub
117.	<i>Moringa oleifera</i>	Moringaceae	Tree
118.	<i>Mucuna pruriens</i>	Fabaceae	Climber
119.	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Tree
120.	<i>Ochna obtusata</i>	Ochnaceae	Small tree
121.	<i>Ocimum basilicum</i>	Lamiaceae	Herb
122.	<i>O.sanctum</i>	Lamiaceae	Herb
123.	<i>Opuntia elatior</i>	Cactaceae	Spinosus Shrub
124.	<i>Oroxylum indicum</i>	Bignoniaceae	Tree

125.	<i>Orthosiphon rubicundus</i>	Lamiaceae	Herb
126.	<i>Oxalis corniculata</i>	Oxalidaceae	Herb
127.	<i>Paedaria scandens</i>	Rubiaceae	Climbing shrub
128.	<i>Panicum repens</i>	Poaceae	Grass
129.	<i>Phyllanthus fraternus</i>	Euphorbiaceae	Herb
130.	<i>Plumbago zeylanica</i>	Plumbaginaceae	Shrub
131.	<i>Polygala arvensis</i>	Polygalaceae	Herb
132.	<i>Polygonum glabrum</i>	Polygonaceae	Herb
133.	<i>Psoralea corylifolia</i>	Fabaceae	Herb
134.	<i>Pterospermum acerifolium</i>	Sterculiaceae	Tree
135.	<i>Pueraria tuberosa</i>	Fabaceae	Woody climber
136.	<i>Pygmaepremna herbacea</i>	Verbenaceae	Herb
137.	<i>Rauvolfia serpentina</i>	Apocynaceae	Under shrub
138.	<i>Saccharum spontaneum</i>	Poaceae	Solid stem Grass
139.	<i>Scoparia dulcis</i>	Scrophulariaceae	Herb
140.	<i>Selaginella bryopteris</i>	Sellaginellaceae	Fern
141.	<i>Semecarpus anacardium</i>	Anacardiaceae	Tree
142.	<i>Sida cordata</i>	Malvaceae	Herb
143.	<i>Sida cordifolia</i>	Malvaceae	Herb
144.	<i>Sida rhombifolia</i>	Malvaceae	Herb
145.	<i>Smilax macrophylla</i>	Smilacaceae	Climber
146.	<i>S. ovalifolia</i>	Smilacaceae	Climber
147.	<i>Solanum nigrum</i>	Solanaceae	Herb
148.	<i>S. surattense</i>	Solanaceae	Herb
149.	<i>Soyimida febrifuga</i>	Meliaceae	Tree
150.	<i>Sphaeranthus indicus</i>	Asteraceae	Herb
151.	<i>Spondias pinnata</i>	Anacardiaceae	Tree
152.	<i>Stereospermum chelonoides</i>	Bignoniaceae	Tree
153.	<i>Symplocos racemosa</i>	Symplocaceae	Tree
154.	<i>Syzygium cumini</i>	Myrtaceae	Tree
155.	<i>Tamarindus indica</i>	Caesalpiniaceae	Tree
156.	<i>Tephrosia purpurea</i>	Fabaceae	Under shrub
157.	<i>Terminalia bellirica</i>	Combretaceae	Tree
158.	<i>Terminalia chebula</i>	Combretaceae	Tree
159.	<i>T. arjuna</i>	Combretaceae	Tree
160.	<i>Thespesia lampas</i>	Malvaceae	Under shrub
161.	<i>Tragia involucrata</i>	Asteraceae	Herb
162.	<i>Tridax procumbens</i>	Asteraceae	Herb
163.	<i>Typhonium trilobatum</i>	Araceae	Tuberous herb
164.	<i>Vanda roxburghii</i>	Orchidaceae	Epiphytes
165.	<i>Ventilago denticulata</i>	Rhamnaceae	Shrub
166.	<i>Vetiveria zizanioides</i>	Poaceae	Tufted grass
167.	<i>Vitex negundo</i>	Verbenaceae	Shrub
168.	<i>V. peduncularis</i>	Verbenaceae	Tree
169.	<i>Woodfordia fruticosa</i>	Lythraceae	Shrub