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Multiple usages of forest trees by the tribes of Kalahandi District, Orissa, India

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Forest trees are the integral part of human society. Forest trees provide both direct and indirect benefits to humans. The number of products provided by trees worldwide is extensive. The wood, bark, leaves, fruits, seeds and roots of trees yield food, fodder, shelter, medicine, fibre, resin, oils and other numerous products used for subsistence of people living in rural and tribal areas. There is a great international interest in the so-called multipurpose trees, but in practice, virtually all tree species can be used for more than one purpose. In some areas in India, the life and livelihood of the tribes depend on trees, as they provide all the commodities required by them in their day to day life. However, in recent days, there is rapid depletion of forest covers, which results in loss of these valuable trees, thereby affecting the livelihood and culture of the tribes. In this regard, the paper is an attempt to study, based on sustainable development strategy of forest resources, the ethnobotany on multiple uses of tree species by the tribes of Kalahandi District, Orissa, India. The study was carried out during 1998-1999, with four tribal groups named *Gonda, Kandha, Kutia Kandha* and *Shabara,* in four community development blocks of the district. The multiple uses of 40 tree species belonging to 22 families were documented. Medicinal and non-medicinal usages were recorded.

Key words: Forest trees, ethnobotany, medicinal uses, Kalahandi, tribal.

INTRODUCTION

It has never been more urgent than now to realize the full potential of forest trees for sustainable development, both to meet the immediate and future needs of increasing populations and to provide the continuity of the natural resource base (Sah and Dutta, 1996).

Tropical forests are often reffered to as one of the most species-diverse terrestrial ecosystems. Their immense biodiversity generates a variety of natural resources which help to sustain the livelihood of local communities (Mishra, 1968; Khan et al., 1997; Kumar et al., 2002). Trees form the major structural and functional basis of tropical forest ecosystems and can serve as robust indicator of changes and stressors at the landscape scale (Mishra, 1968). In India, many tree species have potential for multiple uses. The livelihood, economy and the socio-cultural life of the tribal people are directly linked with forest trees.

There is a great international interest in the so-called multipurpose trees (Burley and von Carlowitz, 1984), but in practice, virtually all tree species can be used for more than one purpose. In recent years (2010 TO 2012), these multipoupose trees play an important role in agro-forestry systems. They help to protect watershed, soil erosion , carbon sequestration and produce high value timber, pulp, paper, bioenergy and various other traditional products. In this respect, they differ from major agricultural species, which are generally grown for single product and often for specialized uses.

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Figure 1. Map of Kalahandi district showing the area of study.

Forest trees provide a variety of benefits to humans. Those benefits can be divided into two major categories: direct and indirect benefits (Burley, 1987). Direct benefits and uses include forest products of economic importance, such as timber and other construction materials, fuel wood and fodder. Trees have been used throughout the world for millennia and today over one-half of the wood used each year is burned for heating and cooking all over the world. The indirect benefits of trees include environmental protection and amenity (social) values. Trees contribute to the sustainability of land productivity by contributing to the formation, structure and fertility of soil in many ways. Trees also contribute significantly to reducing greenhouse gases and associated global temperature rises.

The number of products provided by trees worldwide is extensive. The wood, bark, leaves, fruits, seeds and roots of trees yield food, fodder, shelter, medicine, fibre, resin, oils and numerous other products used for subsistence and industrial purposes. In some countries, the products from trees are important contributors to individual, village and national economies (Myers, 1983). In India, Myers (1998) estimates that the amount of annual revenue derived from such minor forest products is $200 million. According to Forest Statistics of India (2011), annual revenue from such minor forest produce is $ 800 million. This equals or exceeds India's revenue from wood extracted from the forest.

Tress and tribes are interlinked just like two sides of a coin. The life and livelihood of tribes depends on trees, as they provide all the commodities required by them. Therefore, the importance of forest trees to the economics, life style and socio-cultural life of the tribal population in India and beyond is known. Rapid depletion of these valuable natural resources would affect tribal life and culture. In this context, the study of multiple uses (medicinal and non-medicinal) of trees will help to identify valuable species and default will help to establish strategy for ensuring a natural resource base in time. So, the paper is an attempt to study the multiple usages of tree species by people from four tribal groups viz: *Gond*, *Kandha*, *Kutia Kandha* and *Shabar* of Kalahandi District of Orissa State, India. The study was carried out with three dominant tribes from 4 community development blocks of Kalahandi District.

The study area

Kalahandi District is located in the South western portion of Orissa State, India and lies between 19°.3' N and 21°.5' N latitudes and 82°.20' E and 83°.47' E longitudes Figure 1**.** The total geographical area is 7920 km^2. The total forest cover of the district is 2538 km^2, which constitutes 32% of total geographical area. Total population of the district is 1335494, with a population density of 169 per km^2. The schedule tribe (ST) population is 385273 (28.84%) and the schedule caste (SC) population is 236019 (17.67 %); the total SC/ST population constitutes 46.51% of the total population of the district. The literacy percentage of the district is 62.45%. The district is divided into 13 Community Development Blocks with a total of 2236 villages. There are 46 different tribal groups residing in the district. Out of these 46 tribes, there are 12 numerically important tribes viz: *Banjara, Bhottada, Bhujia*, *Binjhal*, *Dal*, *Gond*, *Kutia Kandha*, *Kandha, Mirdha, Munda*, *Paroja*, *Saora and Shabar*. These 12 tribes together constitute 97% of the total tribal population of the district. However, the three largest tribes are *Kandha*, *Gond* and *Shabar*.

MATERIALS AND METHODS

The study was carried out in 32 villages in four community development blocks viz: Bhawanitana, Lanjigarh, Madanpur-Rampur and Thumul-Rampur of Kalahandi district from 1998 to 1999 on a project mode. During the study, ethnobotanical information was collected from 43 knowledgeable persons representing four tribal groups viz: *Gond, Kandha, Kutia Kandha* and *Shabar* from the 32 villages. The ethnobotanical information was collected on the species for their medicinal and non medicinal usages. Different participatory tools like preference ranking, matrix ranking were used to collect data through focused group discussion in each tribal village. During the study, the team collected information from different knowledgeable individuals like traditional healthcare practitioners, traditional artisans, experienced farmers, old women, fisherman, carpenters, forest dwellers, non-timber forest produce collectors etc. Ethnobotanical information was collected through structured questionnaire. Separate interviews were made with these three major tribes from the four community development blocks. Collection of plant specimens for preparation of herbariums was made. Photographs were taken of each species. (Figures 2 to 4). Out of the 40 plant specimens, nearly 27 were identified by us and another 13 plant specimens were identified at Regional Plant Resource Centre, Bhubaneswar, Orissa. Herbariums were kept at the Genebank of M. S. Swaminathan Research Foundation, Chennai.

RESULTS AND DISCUSSION

40 tree species belonging to 22 families are documented during the study. Details of multiple uses of these tree species are provided in Table 1. The non-medicinal uses of these species include house construction, agricultural implements, fuel wood, gum, insect and pest repellant, edible fruit, timber, body or massage oil, bio-fencing, fish poison, country liquor etc. The medicinal uses include diarrhea, dysentery, fever, cold and cough, cut wound, skin diseases, headache etc. For medicinal purpose, they use various plant parts like bark (30%), leaf (30%), root (10%), seed (20%) and fruit (10%). The family, *combretaceae* mostly dominates in terms of number of species utilized for multiple purposes by the tribal people. It is followed by *anacardiaceae*, *euphorbiaceae* having 4 species each. *Fabaceae* and *mimosaceae* contribute 3 species each. There are 12 families that contribute single species only.

The families of the documented species are combretaceae (5 species.), anacardiaceae (4 Species), euphorbiaceae (4 species), mimosaceae (3 species), fabaceae (3 species), barringtoniaceae (2 species), meliaceae (2 species), moraceae (2 species), sapindaceae (2 species), annonaceae (1 species), bignonaceae (1 species), bombacaceae (1 species), caesalpiniaceae (1 species), dipterocarpaceae (1 species), ebenaceae (1 species), lythraceae (1 species), myrtaceae (1 species), rubiaceae(1 Species), rutaceae (1 species), sapotaceae (1 species), sterculaceae (1 species) and verbenaceae(1 species)

Out of the 10 preferred tree species for non-medicinal use, three species mostly dominate and are used among all the four tribes of the district (Table 2). They are Sala (*Shorea robusta*), Bija (*Pterocarpus marsupium*) and Kusuma (*Schleichera oleosa*). In all the species, Sala (*S. robusta*) tree is the most essential tree species used by the tribes of the region. Tribal people worship this tree. Almost all tribal households utilize this tree in their everyday life, leading to its over-exploitation from the wild. The use ranges from tooth brush to timber. There is a great pressure on the population of this tree species.

All the 40 tree species have more or less ethnomedicinal value. These species are utilized by tribal people for their primary healthcare. Of the 10 prioritized tree species used for medicinal purposes, three species viz: Limba (*Azadirachta indica*), Arjuna (*Terminalia arjuna*) and Jamurala (*Syzygium cumini*) are quite dominant (Table 3).

However, there are three plant species, which have both medicinal and non-medicinal values and are widely used across different tribal groups. They are Sala (*S. robusta*), Jamurala (*S. cumini*) and Limba (*A. indica*).

Conclusion

Plants are the integral part of the tribal life and a major source of livelihood during off-farm season. However, in recent days there is a rapid depletion of these valuable trees because of over exploitation from its wild habitat. Both ex-situ and in-situ conservation of these plant species has to be taken up to ensure that these plants will be available for future generation. Apart from the ex-situ and in-situ conservation, community conservation is the effective way to conserve these valuable multipurpose trees. Documentation of such traditional knowledge and use will help in fighting against biopiracy. More research has to be carried out on ethno-medicinal plants used by the tribes of the district to safeguard the traditional knowledge under the intellectual property rights of tribal people. Conservation, enhancement and use of these plant species will contribute to the economic enhancement of these tribal people of the district, thereby securing their livelihood. Scientific research has to be carried out to validate this traditional knowledge on medicinal use of the tree species. Sustainable harvest protocol has to be developed for better management of these plant species in the wild habitats.

There are three plant species, viz: Sala (*S. robusta*), Jamurala (*S. cumini*) and Limba (*A. indica*), which have both medicinal and non-medicinal usages; they could be termed key stone species, whose role is critical to the ecosystem, since they play a major role in the day to day requirement of tribal people such as fuel, fodder, agricultural implements, housing, timber, edible fruits and medicine.

The government should take an active role in promoting these multipurpose trees though large scale plantation in forest and non-forest areas to secure the life

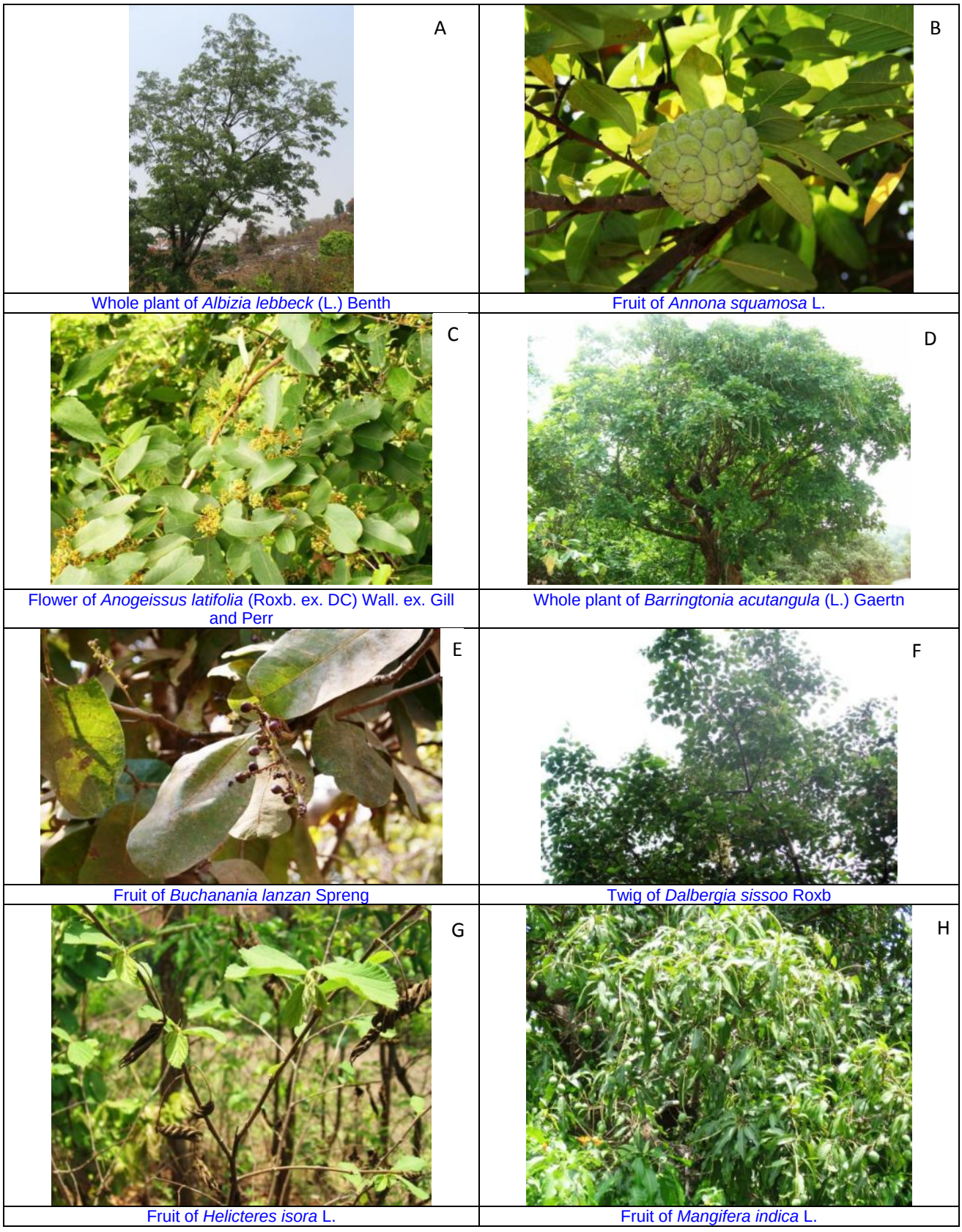

Figure 2. Photographs of each species. **(A)** Whole plant of *Albizia lebbeck* (L.) Benth; **(B)** Fruit of *Annona squamosa* L.; **(C)** Flower of *Anogeissus latifolia* (Roxb. ex. DC) Wall. ex. Gill and Perr; **(D)** Whole plant of *Barringtonia acutangula* (L.) Gaertn; **(E)** Fruit of *Buchanania lanzan* Spreng; **(F)** Twig of *Dalbergia sissoo* Roxb; **(G)** Fruit of *Helicteres isora* L.; **(H)** Fruit of *Mangifera indica* L.

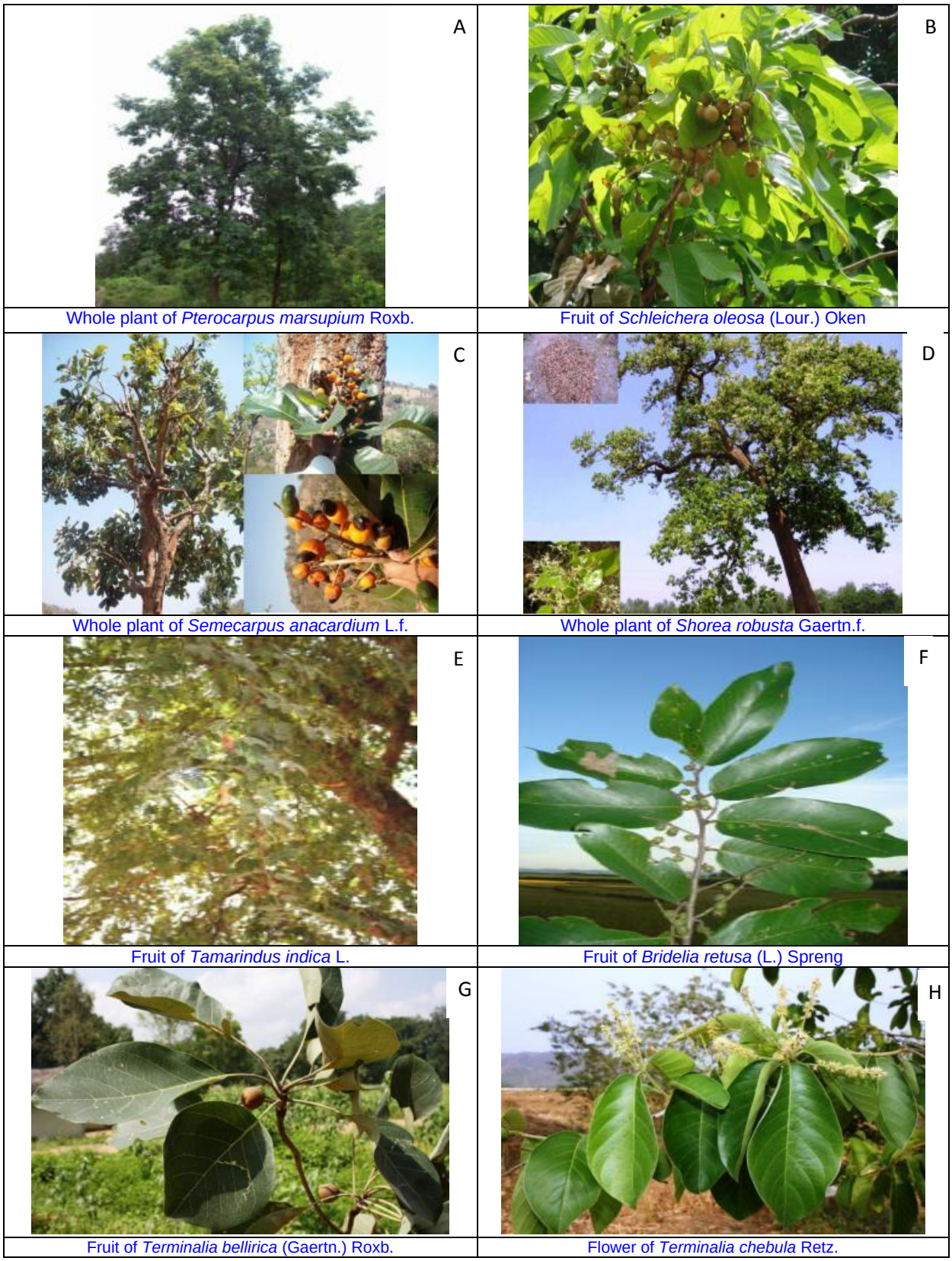

Figure 3. Photographs of each species. **(A)** Whole plant of Pterocarpus marsupium Roxb; **(B)** Fruit of Schleichera oleosa (Lour.) Oken; **(C)** Whole plant of Semecarpus anacardium L.f; **(D)** Whole plant of Shorea robusta Gaertn.f: **(E)** Fruit of Tamarindus indica L; **(F)** Fruit of Bridelia retusa (L.) Spreng **(G)** Fruit of Terminalia bellirica (Gaertn.) Roxb**. (H)** Flower of Terminalia chebula Retz.

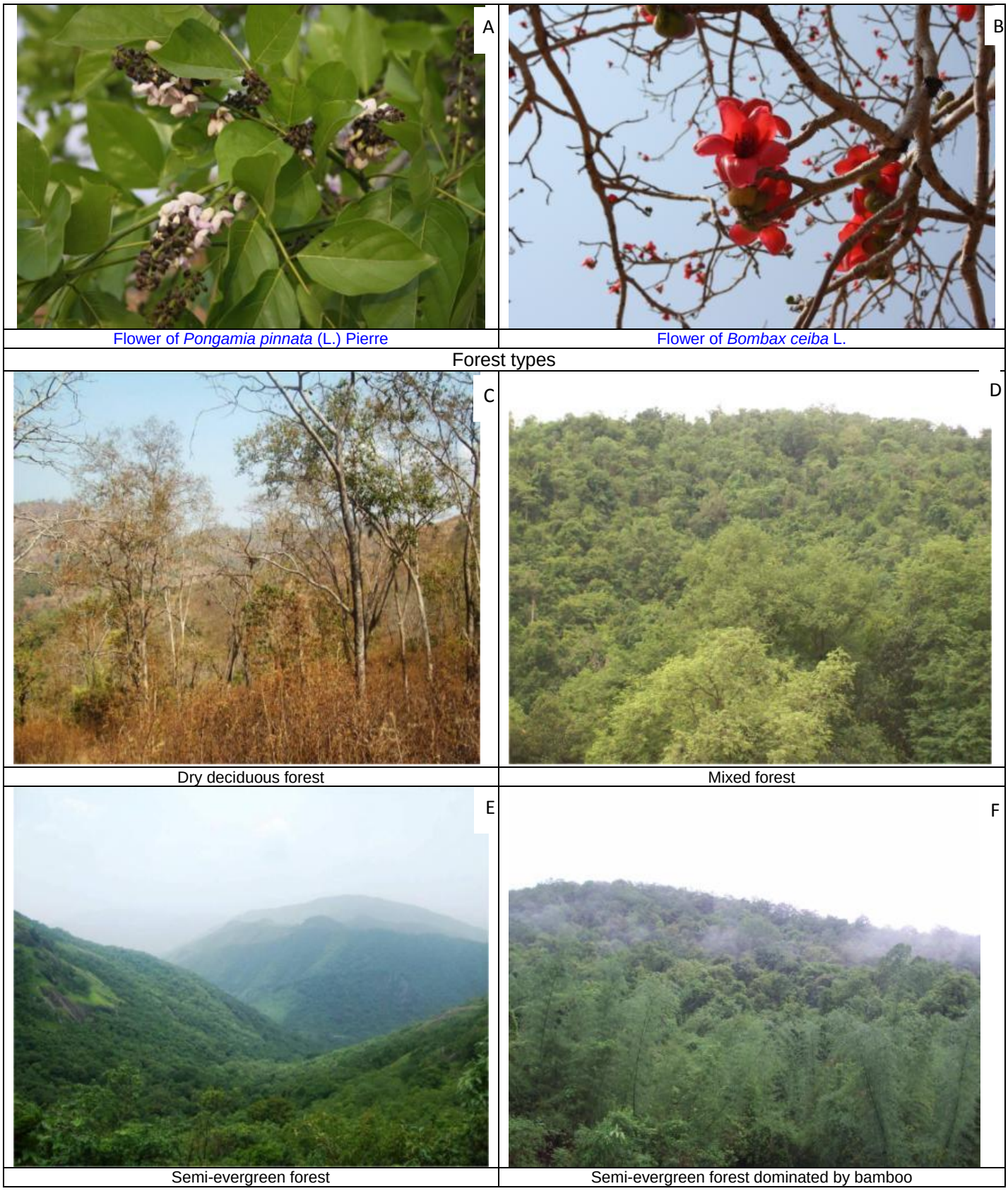

Figure 4. Photographs of each species. **(A)** Flower of Pongamia pinnata (L.) Pierre; **(B)** Flower of Bombax ceiba L; **(C)** Dry deciduous forest; **(D)** Mixed forest; **(E)** Semi-evergreen forest; **(F)** Semi-evergreen forest dominated by bamboo.

Table 1. Multiple uses of tree species by tribal people of Kalahandi district.

Local name	Botanical name	Family	Multiple usage	Medicinal usage
Kahira	*Acacia catechu* (L.f.) Willd.	*Mimosaceae*	House construction, furniture	Cold and cough, toothache, throat infection
Sirisha	*Albizia lebbeck* (L.) Benth	*Mimosaceae*	House construction, furniture, agricultural implements	Dog bite
Badel	*Annona squamosa* L.	*Annonaceae*	Insect and pest repellant, bio-pesticide, shampoo, edible fruit	Lice, cuts and wounds
Dhaura	*Anogeissus latifolia* (Roxb. ex. DC) Wall. ex. Gill & Perr	*Combretaceae*	House construction, bio-fencing, fuel wood, agricultural implements	Diarrhoea, cough
Panasa	*Artocarpus heterophyllus* Lam	*Moraceae*	Country liquor, gum, edible fruit, house construction	Headache
Limba	*Azadirachta indica* A. Juss	*Meliaceae*	Tooth brush, body or massage oil, insect and pest repellant, bio-pesticide	Scabies and itches, jaundice, earache, stomachache
Hinjala	*Barringtonia acutangula* (L.) Gaertn	*Barringtoniaceae*	Fish poison, house construction	Dysentery, cut wounds
Simel	*Bombax ceiba* L.	*Bombacaceae*	Gum, cotton for mattress	Bile, acne
Kashi	*Bridelia retusa* (L.) Spreng	*Euphorbiaceae*	Furniture, fuel wood, house construction, agricultural implements	Stomachache, Pyorrhoea
Chara	*Buchanania lanzan* Spreng.	*Anacardiaceae*	Bio-fencing, , edible fruit	Cut wound, blood dysentery, toothache, loose motion
Kumbhi	*Careya arborea* Roxb.	*Barringtoniaceae*	Furniture, snake repellant, fish poison	Swelling due to injury
Patua	*Catunaregam spinosa* (Thunb) Tirveng.	*Rubiaceae*	Fish poison, fuel wood	Piles
Bheru	*Chloroxylon swietiana* DC.	*Rutaceae*	House construction, agricultural implements, Insect and pest repellant, Bio-pesticide	Lice
Karla	*Cleistanthus cillinus* (Roxb.) Benth. ex. Hook.f	*Euphorbiaceae*	Bio-fencing, insect and pest repellant, Bio-pesticide, fuel wood	Scabies and itches
Sisoo	*Dalbergia sissoo* Roxb.	*Fabaceae*	Furniture, house construction	Scabies and itches
Kendu	*Diospyros melanoxylon* Roxb.	*Ebenaceae*	Tooth brush, edible fruit, fuel wood	Diarrhoea
Dimiri	*Ficus hispida* L. f.	*Moraceae*	Country liquor, gum, edible fruit	Cuts, diarrhoea, gonorrhoea, fever, dysentery
Ganda,	*Glochidion lanceolarium* (Roxb.) Dalz.	*Euphorbiaceae*	Bio-fencing, tooth brush	Skin diseases
Gambhari	*Gmelina arborea* Roxb.	*Verbenaceae*	Furniture, agricultural implements	Dysentery
Baranga	*Helicteres isora* L.	*Sterculaceae*	House construction, fuel wood	Cuts and wounds, gripping
Sinamara	*Lagerstgroemia parviflora* Roxb.	*Lythraceae*	House construction, bio-fencing, fuel wood	Urticaria, fever
Mudei	*Lannea coromendelica* (Houtt.) Merr	*Anacardiaceae*	Agricultural implements, gum	Diarrhoea, dysentery
Mahula	*Madhuca indica* Gmel.	*Sapotaceae*	Country liquor, edible oil, sacred plant	Chest pain, pain during delivery
Sindura	*Mallotus philippensis*	*Euphorbiaceae*	Dye, fuel wood	Menstrual disorder
Amba	*Mangifera indica* L.	*Anacardiaceae*	Country liquor, edible fruit	Loose motion
Karanja	*Pongamia pinnata* (L.) Pierre	*Fabaceae*	Tooth brush, body or massage oil	Headache, menstrual disorder, piles, cataract, worm infection , skin diseases

Table 1. Contd.

Bija	*Pterocarpus marsupium* Roxb.	*Fabaceae*	House construction, furniture, gum	Diabetes, stomachache
Ritha	*Sapindus emarginata* Vahl.	*Sapindaceae*	Shampoo	Epilepsy, throat infection, piles, headache
Kusuma	*Schleichera oleosa* (Lour.) Oken	*Sapindaceae*	Furniture, body or massage oil, edible oil, Edible fruit, fuel wood	Body pain
Bhalia	*Semecarpus anacardium* L.f.	*Anacardiaceae*	Edible fruit, fuel wood	Piles, rheumatism
Sala	*Shorea robusta* Gaertn.f.	*Dipterocarpaceae*	House construction, bio-fencing, furniture, fuel wood, agricultural implements, Toothbrush, Edible oil, sacred plant	Wound, chicken pox, chest pain, stomachache
Rahen	*Soymida febrifuga* (Roxb.) A. Juss	*Meliaceae*	House construction	Fever, diarrhoea
Padel	*Stereospermum chelonoides* (L.f.) DC	*Bignonaceae*	Fuel wood	Night blindness
Jamurala	*Syzygium cumini* (L.) Skeels	*Myrtaceae*	Fodder, country liquor, furniture, agricultural implements, edible fruit	Burn injury, mouth ulcer, tonsil, diabetes, diarrhoea, stomach disorder
Tentuli	*Tamarindus indica* L.	*Caesalpiniaceae*	Country liquor, gum, edible fruit	Leucorrhoea, bone fracture, dysentery, boils
Arjuna	*Terminalia arjuna* (Roxb. ex DC) Wight & Arn	*Combretaceae*	Furniture, shampoo, fuel wood	Bone fracture, burn injury, asthma, blood vomiting, heart diseases
Bahada	*Terminalia bellirica* (Gaertn.) Roxb.	*Combretaceae*	Gum	Headache, stomach disorder, cold and cough, constipation
Harida	*Terminalia chebula* Retz.	*Combretaceae*	Shampoo	Skin diseases, diarrhoea, constipation
Sahaja	*Terminalia tomentosa* (DC.) Wight & Arn.	*Combretaceae*	Fodder, fuelwood, tooth brush	Vomiting, skin diseases, loose motion
Tangeni	*Xylia xylocarpa* Roxb.	*Mimosaceae*	House construction, bio-fencing, fodder, edible fruit	Skin diseases

Table 2. Ranking of tree species preferred for non-medicinal uses.

Vernacular name	Botanical name	Family	Rank
Sala	*Shorea robusta* Gaertn.f.	*Dipterocarpaceae*	1
Bija	*Pterocarpus marsupium* Roxb.	*Fabaceae*	2
Kusuma	*Schleichera oleosa* (Lour.) Oken	*Sapindaceae*	3
Tangeni	*Xylia xylocarpa* (Roxb.)	*Mimosaceae*	4
Dhaura	*Anogeissus latifolia* (Roxb. ex. DC) Wall. ex. Gill & Perr	*Combretaceae*	5
Mahula	*Madhuca indica* Gmel.	*Sapotaceae*	6
Bheru	*Chloroxylon swietiana* DC.	*Rutaceae*	7
Gambhari	*Gmelina arborea* Roxb.	*Verbenaceae*	8
Sirisha	*Albizia lebbeck* (L.) Benth	*Mimosaceae*	9
Sisoo	*Dalbergia sissoo* Roxb.	*Fabaceae*	10

Table 3. Ranking of tree species preferred for medicinal uses.

Vernacular name	Botanical name	Family	Rank
Limba	*Azadirachta indica* A. Juss	Meliaceae	1
Arjuna	*Terminalia arjuna* (Roxb. ex DC) Wight & Arn	Combretaceae	2
Jamurala	*Syzygium cumini* (L.) Skeels	Myrtaceae	3
Karanja	*Pongamia pinnata* (L.) Pierre	Fabaceae	4
Bahada	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	5
Harida	*Terminalia chebula* Retz.	Combretaceae	6
Chara	*Buchanania lanzan* Spreng.	Anacardiaceae	7
Dimiri	*Ficus hispida* L. f.	Moraceae	8

and livelihood of tribal people. Plantation of these species will benefit the tribal people than planting exotic species like *Eucalyptus* or *Acacia*.

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