Traditional Uses and Sustainable Collection of Ethnobotanicals by Aboriginal Communities of the Achanakmaar Amarkantak Biosphere Reserve of India

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Abstract: In the due course of study, focus was prearranged on the traditional use of trees, herbs and shrubs (ethnobotanicals) which are little or unknown to modern societies. Through questionnaire and interviews, the present study was attempted to collect the information about the people who still live in traditional world. A total 40 tree species, 94 herbs including tubers, grasses, climbers and 13 shrubs utilize by aboriginal communities of Achanakmaar Amarkantak Biosphere Reserve (AABR), were renowned/ explored for different utilization pattern. The most important tree species collected from the forests and nearby village areas by the local people are Madhuca indica, Buchanania lanzan, Diospyrus melanoxylon, Mangifera indica, Shorea robusta and Terminalia tomentosa etc. Similarly, herbs collected are Eclipta alba, Panicum antidotale, Smithia conferta, Phyla nodiflora, Dioscorea bulbifera, Curculigo orchioides, Oxalis corniculata, Portulaca oleracea, Solanum nodiflorum, Achyranthus aspera, Leucas aspera, Corchorus trilobularis, Cassia tora etc. The most common reported shrubs of these areas are Phoenix sylvestris, Randia dumetorum, Ziziphus zilopyrus and Lantana camara. The reported botanicals have variety of uses like vegetable, fruit, furniture, religious use, rituals use, and for handloom preparation. Besides the consumption value, forest also source of subsistence for this hidden and marginalized society of the world. The current study confirmed that there is a vital necessity for documentation of traditional knowledge associated to the Bagia aboriginals and others insubstantial cultural inheritance regarding traditional plant uses. Further, it can provide a baseline ethnobotanicals utilization pattern data that may be guiding parameter for the prioritization and conservation of these natural resources along with bio-prospecting indigenous traditional knowledge.

Keywords: Aboriginals, Forests, Sustainable, Aabr, Ethnobotanicals

1. Introduction

The human beings are closely associated with forest for their existence and civilization. The relationship between human being and forest has been important for the development of society (Riter et al. 2013). The development of society is based on various function of forest like productive, ecological, social and cultural etc.

The aboriginals /indigenous people continuously (generation to generation) associated with forest and often possess a broad knowledge base about the complex ecological behavior of forest in their own localities (Gadgil et al. 1993). Most of people live in and around forest belongs to tribal communities. These forest dwellers collect different type of forest produce from forest either for their own consumption or for sale in the market. The collection intensity of forest produces mainly dependent
on availability, knowledge and easily accessibility of it (Kala, 2009). Millions of people, particularly tribal and rural communities in many developing countries still collect and consumed a wide variety of wild plant resources to meet their food requirements (FAO, 2004; Balemie et al. 2006; Bharucha et al. 2010, Dobriyal, et al, 2015). Forest is an important source of highly nutritious value food for tribes. Intensive studies concerning its nutritional role have also been highlighted in many surveys around the world (Tanji et al. 1995; Ogle et al. 2001; Bonet et al. 2002; Guerrera et al. 2003; Ogoye-Ndegwa et al. 2003; Ertug, 2004; Tardio et al. 2005; Javier et al. 2006). These wild plants provide balance diet by supplementing essential nutrients and minerals for human being. The wild plants have been recognized as potential source of nutrition than conventionally eaten crops (Grivetti et al. 2000). Due to modernization in society (advanced communication, transportation and technology) there is a mixing of culture and customs of these forest dwellers, but still they have endowed with many traditional rituals, beliefs, norms and practices which are highly associated with forest. Tribal communities have strong cultural, spiritual and livelihood link with forest. The Achanakmaar Amarkantak Biosphere reserve (AABR) in Central India is known to home of several Non Timber Forest Produce (NTFPs), rare and endangered medicinal aromatic plant and different type of forest ranging from subtropical to dry deciduous, which greatly contribute to livelihoods of inhabited tribal communities. The inhabited tribes in AABR are mostly belonging to Baiga, Gond, Kol, Kanwar, Pradhan and Panka communities. Every plant on earth has utility but bio-prospecting this resource is a big task. These forest dwellers have vast knowledge about appropriate uses of forest products. They are very well aware that plants play very important role in generating the ecological services and natural resources on which they depend. They consider every part of environment from trees to rivers as very important part of their life as they are the only means of human survival as per their understanding (Pandey, 1997). Forest dependent communities are usually located far from cities and fertile agriculture areas, so these communities fulfill their almost day to day need from forest (Yeo-Chang, 2009). Most of the basic needs of these tribe’s like food (leafy vegetables, fruit, and kodo, kutki, sama grains), shelter (Bamboo, grasses and leafs) and income (by selling leaf of bahunia, mushroom and mahua flowers etc.) are fulfilled through forest. Tribal communities have symbiotic relation with forest they (forest and tribe) depend on each others. The tribal communities have extensive knowledge about the traditional uses of these natural resources which are little or unknown to modern societies. The knowledge remained just with the people who are acquainted with these uses and has rarely been documented otherwise (Burgi et al. 2013). There is a real need for field-level research, synthesis and collection of information on tribal-forest association. With this background, a need was felt to collect in-depth information on the tree species growing in AABR and used by tribal groups in view of documenting the knowledge which may be under threat due to the influence of modernization. This paper thus aims to highlight and record in detail the traditional knowledge of tribal groups on the use of various tree species growing in AABR.

2. Methodology

2.1. Study Area

The AABR lays between21° 15' to 22° 58' N latitude and 81°25' to 82° 5' E longitude. The Achanakmar Amarkantak Biosphere Reserve is spread over an area of 383551.0 ha in Deccan Peninsula bio-geographic zone of Chhattisgarh and Madhya Pradesh and comprises of tropical moist deciduous to tropical dry deciduous forests. The total geographical area of AABR is 383551.0 ha of which 55155.0 ha is under the core zone and remaining 28396.889 ha comprises the buffer zone. The zonation in AABR makes clear the ecological and socio-economical independence between each zone of AABR. The core region of the AABR is situated in Chhattisgarh state whereas the buffer and transition zones lie partly both in Madhya Pradesh and Chhattisgarh. The AABR possessed rich plant and animal diversity. It is similarly known for its cultural diversity, as it is colonized by number of tribal and non-tribal group of people.

2.2. Survey Methods

The present study was carried out in buffer zone and core zone’s villages of AABR. A total of 7 villages in buffer zone namely Amadoab, Kewanchi, Piper Khuti, Kachhra tola, Roopan dan, Pattar coni, Madna dipo and 5 villages of core zone namely Lannin, Birar pani, Chhiriitta, Ataryaa and Ranchaki were selected for intensive study of traditional knowledge on the use of flora of AABR (Table 1). The location map of study area is depicted in Fig 1. The selected villages of core zone were dominated by tribal communities while buffer zone has both tribal and non tribal communities. The randomly selected tribals hamlets and families from different communities were questionnaire survey in the selected villages of AABR. The important part of the questionnaire were discussed with 60 to 70 years villagers because they have great experience regarding the use of forest products. The females provided the information mainly regarding the wild vegetables. Through questionnaire survey and interviews the information was collected on the indigenous uses of tree species, their processing techniques, consumption pattern, plant part use, local name of tree species and their occurrence in AABR. The questions were also asked on the role of forest products on the economy of tribal community and non tribal communities reside in and around the biosphere reserve. Apart from questionnaire
survey, the local people were encouraged to give their ideas and perceptions on various uses of herbs, shrubs and tree species. Information was collected on ethnobotanicals by participating in various cultural activities of the local tribal people. Efforts were made to scrutinize the tree species used in various socio-cultural practices of the local people including childbirth, death and marriage ceremony. The related cultural practices and norms for collection of a variety of forest produce and parts of particular tree species were also documented through group discussion. The experienced local people were also requested to escort during the forest survey for identification of tree species and related indigenous knowledge.

![Study area and location of field study of achanakmaar amarkantak biosphere reserve.](image)

**Figure 1.** Study area and location of field study of achanakmaar amarkantak biosphere reserve.

**Table 1.** List of villages, surveyed in aabr.

| S. N | Village Name | GPS Location | Elevation MSL (m) | Informants | Localities | Population (2011 census) |
|------|--------------|--------------|------------------|------------|------------|-------------------------|
| 1.   | Lamni        | N-22°32'32.53" E-81°44'37.20" | 569            | 18         | 4          | 634                     |
| 2.   | Birar pani   | N-22°32'36.30" E-81°38'36.70" | 781            | 13         | 3          | 75                      |
| 3.   | Chirhatta    | N-22°31'23.50" E-81°41'46.60" | 446            | 11         | 3          | 94                      |
| 4.   | Atariya      | N-22°34'08.07" E-81°45'12.71" | 598            | 17         | 5          | 668                     |
| 5.   | Ranchaki     | N-22°34'.445" E-81°41'.553"   | 701            | 15         | 3          | 342                     |

| S. N | Village Name | GPS Location | Elevation MSL (m) | Informants | Localities | Population (2011 census) |
|------|--------------|--------------|------------------|------------|------------|-------------------------|
| 1.   | Aamadob      | N-22°37'17.68" E-81°44'10.77" | 656            | 21         | 4          | 1208                    |
| 2.   | Kewanchhi    | N-22°37'17.73" E-81°46'44.82" | 578            | 23         | 6          | 846                     |
| 3.   | Pipar Khuti  | N-22°39'36.33" E-81°52'08.80" | 596            | 27         | 8          | 786                     |
| 4.   | Kachra tola  | N-22°40'47.45" E-81°52'59.82" | 600            | 11         | 2          | 332                     |
| 5.   | Roopan dand  | N-22°41'52.17" E-81°53'31.51" | 591            | 13         | 3          | 1003                    |
| 6.   | Paterkoni    | N-22°42'55.83" E-81°53'48.02" | 594            | 09         | 2          | 787                     |
| 7.   | Madana       | N-22°43'42.82" E-81°54'07.54" | 604            | 23         | 5          | 861                     |

Parts used by local people were cross-checked with other people and evaluate the result from personal interview and discussions in group with local people provide much valuable and specific information regarding the traditional uses of plants.
3. Results and Discussion

The present study brought it in to the light that there are many traditional uses of forest which are well known by indigenous communities meanwhile the modern society have very limited or insufficient knowledge on these uses. In the same way various plants used by the local people of AABR are such type of distinctive uses of the plants. A total 40 tree species, 94 herbs including tubers, grasses, climbers and 10 shrubs utilize by local people of AABR, were renowned during the present study (Table 2, 3 and 4). The most important tree species collected from the forests and nearby village areas by the local people are Madhuca indica, Buchanania lanzan, Diospyrus melanoxylon, Mengifera indica, Phyllanthus emblica, Syzygium cumini, Terminalia chebula, Terminalia bellirica, Shorea robusta and Terminalia tomentosa. The local people have multiple uses of ethnobotanical plants, of these 13 uses are recognized during the present study (Figure 2) and The informants revealed that different morphological plant parts were used by local people (Figure 3) and their distribution of recorded ethnobotanical plants into families are depicted in figure 4. The most common herbs collected from forest or nearby village areas by the local people are Eclipta alba, Panicum antidotale, Smithia conferta, Euphorbia heterophylla, Phyla nodiflora, Dioscorea bulbifera, Curculigo orchoides, Oxalis corniculata, Portulaca oleracea, Echinochloa colona, Solanum nodiflorum, Aegyrianthus aspera, Leucas aspera, Corchorus trilobularis, Cassia tora etc. These herbs mostly used for vegetable and medicinal purpose and some time also used for fruit and grain. The most common reported shrubs of these areas are Phoenix sylvestris, Randia dumetorum, Ziziphus ziloplyrus and Lantana camara. The reported shrubs have variety of uses like vegetable, fruit and for handloom preparation. Most of species are used as food (38%), 5% and medicine (54%). Besides, the plant species are used to execute cultural practices (1.9%), for fuel wood (5.5%), house construction (6.9%), making agriculture tools and instruments (4.1%), furniture (3.5%), as fish poison (1.3%), fodder, oil making, liquor preparation, rope, cup and plate making, and bio-fencing. Seed, dye, leaf, tubers, mushrooms, gum, resin, root, fruit, flower and twig of plants are also used and collected from the forests. The gum mainly collected from Shorea robusta, Anogeissus latifolia, Boswellia serrata and Sterculia urens. The species which used for day to day needs like house construction, making agricultural implements, fuel wood, fodder purpose, and manufacturing boundary wall are cut down around the year as per needs. However, there are a few tree species, such as, Ficus religiosa, Aegle marmelos, Syzygium cumini, Madhuca indica and Shorea robusta, having socio-cultural importance to local people are harvested/felled after some local rituals or prayer practices.

Table 2. Herbaceous flora of aabr with local name, scientific name and family name along with their uses.

| S. No | common name      | Scientific name                    | Family     | Habit | uses   |
|-------|------------------|------------------------------------|------------|-------|--------|
| 1.    | Katua shak       | Alternanthera philoxeroides (Mart.) Griseb. | Amaranthaceae | H     | V      |
| 2.    | Kubbi            | Ageratum conyzoides (L.) L.         | Asteraceae  | H     | M      |
| 3.    | Kurie            | Bidens pilosa L.                   | Asteraceae  | H     | M      |
| 4.    | Safed murga      | Celosia argentea L.                | Amaranthaceae | H   | M & V  |
| 5.    | Bhirangraj       | Eclipta alba (L.) Hassk.           | Asteraceae  | H     | M      |
| 6.    | Kutki            | Panicum antidotale Retz.           | Poaceae     | G     | F      |
| 7.    | Grass lily       | Ipomgenia indica (L.) A.Gray ex Kunth | Poaceae     | G     | Fo     |
| 8.    | Meethi buti      | Scoparia dulcis L.                 | Plantaginaceae | H   | M      |
| 9.    | Naichbi bhaqi    | Smithia conferta Sm.               | Fabaceae    | H     | V      |
| 10.   | Kanghi           | Blainvillea acemila (L.) Philipson | Asteraceae  | H     | M      |
| 11.   | Khal muriya      | Trixis procumbens (L.) L.          | Asteraceae  | H     | M      |
| 12.   | Duddhali         | Sopubia delphinifola G.Don         | Scrophulariaceae | H | M      |
| 13.   | Akarkara         | Spianthis panicalata Wall. ex DC.  | Asteraceae  | H     | M      |
| 14.   | Chaulli          | Alysicarpus monilfer (L.) DC.      | Fabaceae    | H     | M      |
| 15.   | Doodhi           | Euphorbia heterophylla DesF.       | Euphorbiaceae | H   | M      |
| 16.   | Pulpuli grass    | Arthropax hispidus (Thunb.) Makino | Poaceae     | G     | Fo     |
| 17.   | Babui            | Eualliosis binata (Retz.) C.E.Hub. | Poaceae     | G     | Fo     |
| 18.   | Sauri            | Alysicarpus vaginalis (L.) DC.     | Fabaceae    | H     | M      |
| 19.   | Ghugunha         | Crotalaria retusa L.               | Fabaceae    | H     | M      |
| 20.   | Pihri chara      | Meceardina procumbens (Mill.) Small | Scrophulariaceae | H   | F      |
| 21.   | Ratolia           | Phyla nodiflora (L.) Greene        | Verbenaceae | H     | V      |
| 22.   | Khadraati        | Sida acuta Burm.f.                 | Malvaceae   | H     | M      |
| 23.   | Kangni           | Sotaria pumilia (Poir.) Roem. & Schult. | Poaceae    | G     | Fo     |
| 24.   | Bharbhushi       | Eragrostis tenella (L.) P.Beau. ex Roem. & Schult. | Poaceae    | G     | Fo     |
| 25.   | Soli             | Aeschynome americana L.            | Leguminosae | H     | Gm     |
| 26.   | Patthar choor    | Plectranthus mollis (Aiton) Spreng. | Lamiaceae   | H     | M      |
| 27.   | Bariyari         | Sida cordata (Burm.f) Borss.Waalk. | Malvaceae   | H     | M      |
| 28.   | Hirankhuri       | Emilia sonchifolia (L.) DC. ex DC. | Asteraceae  | H     | M      |
| 29.   | Badrajan boya    | Nepea cataria L.                   | Lamiaceae   | H     | M      |
| 30.   | Kevkand          | Dioscorea bulbifera L.             | Dioscoreaceae | C   | M      |
| 31.   | Kali muslhi      | Curculigo orchoides Gaertn         | Agavaceae   | T     | M      |
| S. No | common name               | Scientific name                          | Family                  | Habit | uses |
|-------|---------------------------|------------------------------------------|-------------------------|-------|------|
| 32.   | Tinpaniya                | Oxalis corniculata L.                   | Oxalidaceae             | H     | M & V|
| 33.   | Maskani                  | Evolvulus nummularius (L.)              | Convolvulaceae          | H     | M    |
| 34.   | Chanchu                  | Corchorus fascicularis Lam.             | Tiliaceae               | H     | Fi   |
| 35.   | Kena                     | Commelina diffusa Lam.                  | Commelinaceae           | H     | M    |
| 36.   | Kharmor                  | Rungia pecinata (L.) Nees               | Acanthaceae             | H     | M    |
| 37.   | Ghueen                   | Fimbriyale littorales Gaudich.          | Cyperaceae              | H     | M    |
| 38.   | Nagar motha              | Cyperus gracilis R.Br.                  | Poaceae                 | G     | Fo   |
| 39.   | Bufalo grass             | Passalum conjugatum P.J.Bergius         | Poaceae                 | G     | Fo   |
| 40.   | Baiga sikyab             | Digitaria divaricatissima (R.Br.) Hughes| Poaceae                 | G     | Fo   |
| 41.   | Jangli marua             | Eleusine indica (L.) Gaertn.            | Poaceae                 | G     | Fo   |
| 42.   | Dokar bel                | Vitis carnosa (Lam.) Wall.              | Vitaceae                | H     | M    |
| 43.   | Chui mui                 | Mimosa pudica L.                       | Fabaceae                | H     | M    |
| 44.   | Nuniya bhaji             | Portulaca oleracea L.                  | Portulacaceae           | H     | V    |
| 45.   | Kanthkari                | Solanum xanthocarpum Schrad. & H. Wendl.| Solanaceae             | H     | M    |
| 46.   | Jangli sama              | Echinochloa colona (L.) Link            | Poaceae                 | G     | Ge   |
| 47.   |Amti                      | Solanum nodiflorum Jacq.               | Solanaceae              | H     | V    |
| 48.   | Chirchita                | Achyranthes aspera L.                   | Amaranthaceae           | H     | M    |
| 49.   | Ghooma                    | Leucas aspera (Willd.) Link             | Lamiaceae               | H     | V    |
| 50.   | Kaniya kanda             | Dioscorea oppositifolia L.              | Dioscoreaceae           | C     | M    |
| 51.   | Chench                    | Corchorus trilocularis L.               | Tiliaceae               | H     | V    |
| 52.   | Chanahur                 | Marsdenia tenacissima (Roxb.) Moon      | Asclepiadaceae          | H     | V    |
| 53.   | Van rai                  | Blumeopsis flava (DC.) Gagnep.          | Asteraceae              | H     | M    |
| 54.   | Tikhur                   | Curcuma angustifolia Roxb.              | Zingiberaceae           | T     | M    |
| 55.   | Bhui amla                | Phyllanthus niruri L.                   | Euphorbiaceae           | H     | M    |
| 56.   | Salparni                 | Desmodium gangeticum (L.) DC.          | Fabaceae                | H     | M    |
| 57.   | Satawar                  | Asparagus racemosus Willd.              | Liliaceae               | H     | M    |
| 58.   | Haldi mushli             | Chlorophyllum borivilianum Santapau & R.R.Fern.| Asparagusaceae   | T     | M    |
| 59.   | Datura                   | Datura metel L.                         | Solanaceae              | H     | M, Ru|
| 60.   | Gajar ghas                | Parthenium hysterophorus L.             | Asteraceae              | H     | M    |
| 61.   | Badi dudhi              | Euphorbia hirta L.                      | Euphorbiaceae           | H     | M    |
| 62.   | Chhoti dudhi             | Euphorbia macrophylla Pax               | Euphorbiaceae           | H     | M    |
| 63.   | Bara                     | Flemingia chappar Benth.                | Fabaceae                | H     | Lac  |
| 64.   | Bedarikand               | Coccinia grandis (L.) Voigt             | Cucurbitaceae           | C     | E    |
| 65.   | Jungli san               | Crotalaria spectabilis Roth             | Fabaceae                | H     | M    |
| 66.   | Kalihari                 | Gloriosa superba L.                     | Colchicaceae            | C     | M    |
| 67.   | Kheksa                    | Monomorcia dioica Roxb.                 | Cucurbitaceae           | C     | V    |
| 68.   | Karnata                  | Ipomoea aquatica Forsk.                 | Convolvulaceae          | H     | V    |
| 69.   | Jungle kevanch           | Mucuna pruriens (L.) DC.                | Papilionaceae           | H     | M    |
| 70.   | Jangli pyaj              | Urginea indica (Roxb.) Kunth            | Liliaceae               | H     | M    |
| 71.   | Chirlula                 | Aerva lanata (L.) Juss.                 | Amaranthaceae           | H     | M    |
| 72.   | Chirinya                 | Peristrope roxburghiana (Roem. & Schult.)| Bremek.                | Acanthaceae | H     | M    |
| 73.   | Garundi                  | Alternanthera sessilis (L.) R.Br. ex DC.| Amaranthaceae           | H     | M    |
| 74.   | Jungli rye                | Sisymbrium nigram (L.) Prantl            | Cruciferae              | H     | V    |
| 75.   | Jangli Tulsi             | Ocimum gratissimum L.                   | Lamiaceae               | H     | M    |
| 76.   | Charpoti                 | Phyllis minima L.                       | Solanaceae              | H     | Fe   |
| 77.   | Sargpandha               | Ravoulia serpentina (L.) Benth. ex Kurz| Apocynaceae             | H     | M    |
| 78.   | Sadabahar                | Catharanthus roseus (L.) G.Don          | Apocynaceae             | H     | M    |
| 79.   | Brahmi                    | Bacopa monnieri (L.) Wettst.            | Plantaginaceae          | H     | M    |
| 80.   | Tulsi                     | Ocimum sanctum L.                       | Lamiaceae               | H     | M, Ru|
| 81.   | Chiraita                 | Swertia alba T.N. Ho & S.W. Liu         | Gentianaceae            | H     | M    |
| 82.   | Aswagandha               | Withania somnifera (L.) Dunal           | Solanaceae              | T     | M    |
| 83.   | Chand kal                | Macaranga peltata (Roxb.) Müll.Arg.    | Euphorbiaceae           | H     | M    |
| 84.   | Chaulai                  | Amaranthus spinosus L.                   | Amaranthaceae           | H     | M    |
| 85.   | Tiger lily               | Belamcanda chinensis (L.) DC.           | Iridaceae               | H     | M    |
| 86.   | Bisakhpara               | Boerhavia procumbens Banks ex Roxb.    | Nyctaginaceae           | H     | V    |
| 87.   | Mandukpurni              | Centella asiatica (L.) Urb.             | Apiaceae                | H     | M    |
| 88.   | Ghuia                    | Colocasia esculenta (L.) Schott.        | Araceae                 | H     | V    |
| 89.   | Kev kand                 | Costus speciosus (J.Koenig) Sm.         | Zingiberaceae           | T     | M    |
| 90.   | Amahaldhi               | Curcuma amada Roxb.                     | Zingiberaceae           | T     | M    |
| 91.   | Jungli dhania            | Eryngium foetidum L.                    | Apiaceae                | H     | V    |
| 92.   | Sitap                    | Ruta graveolens L.                      | Rutaceae                | H     | M    |
| 93.   | Mameera                  | Thalictrum foliolosum DC.               | Ranunculaceae           | H     | M    |
| 94.   | Bathua bhaaji            | Chenopodium album L.                    | Chenopodiaceae          | H     | V    |

Legends: F: Food, H: Herb, T: Tuber, C: Climber, G: Grass, M: Medicinal use, V: Vegetable, Fo: Fodder, Fe: Fruit edible, Ru: Religious use, E: Edible, Ge: Grain edible and Gm: Grain edible
Table 3. Traditionally used tree species by local people in AABR.

| S. No. | Common name | Scientific name | Family | Parts used | Uses |
|--------|-------------|-----------------|--------|------------|------|
| 1.     | Bel         | Aegle marmelos  | Rutaceae | Fruit, Leaf | Edible, Medicinal, Religious purpose |
| 2.     | Dhabda      | Anogeissus latifolia | Combretaceae | Stem, Resin | Agriculture implement, Selling |
| 3.     | Mohline     | Bauhinia purpurea | Caesalpiniaeae | Leaf, Flower | House construction, Fuel wood |
| 4.     | Semel       | Bombax ceiba    | Malvaceae | Fruit, Flower | Cup and plate making, Medicinal |
| 5.     | Talei       | Boswellia serrata Roxb. | Burseraceae | Resin | Medicine |
| 6.     | Chironji    | Buchanania lanzan | Anacardiaceae | Fruit, Seed | Edible, Edible |
| 7.     | Khakra      | Butea monosperma | Fabaceae | Leaf | Cup and plate making |
| 8.     | Kumbhi      | Careya arborea  | Lecythidaceae | Bark | Fish poisoning |
| 9.     | Amaltash    | Casia fistula   | Caesalpiniaeae | Fruit | Medicinal |
| 10.    | Mahalimb    | Cedrela toona Roxb. | Meliaceae | Stem, Wood | Furniture |
| 11.    | Ghihriha    | Chloroxylon swietenia | Rutaceae | Stem, Bark | House Construction, Agricultural implements, Fuel wood |
| 12.    | Karra       | Cleistanthus collinus | Euphorbiaceae | Stem | Furniture |
| 13.    | Sita phal   | Custard apple   | Annonaceae | Fruit, Stem | Edible, House Construction, Agricultural implements, Fuel wood |
| 14.    | Shisham     | Dalbergia stoo  | Leguminosae | Stem, Leaf | House Construction, Agricultural implements, Fuel wood, Medicinal |
| 15.    | Guhnohar    | Delonix regia   | Leguminosae | Stem | Fuel wood |
| 16.    | Dhohen      | Dillenia pentagyna Roxb. | Dilleniaceae | Root | Medicinal |
| 17.    | Tendu       | Diospyros melanoxylon Roxb. | Ebenaceae | Fruit, Leaf | Edible (When ripe), Selling |
| 18.    | Bargad      | Ficus benghalensis | Moraceae | Fruit | Edible |
| 19.    | Peepal      | Ficus religiosa  | Moraceae | Whole tree, Fruit, Leaf | Religious, Edible, Fodder |
| 20.    | Kekad       | Garagapinnata Roxb. | Burseraceae | Stem | Agricultural implements |
| 21.    | Lenda       | Lagerstroemia parviflora Roxb. | Lythraceae | Stem | Firewood, Boundary wall making |
| 22.    | Maida       | Lutea sebifera  | Lauraceae | Bark | Medicinal |
| 23.    | Mahua/Guli  | Madhuca indica  | Sapotaceae | Flower, Fruit, Leaf | Edible after cooking, Liquor preparation, Oil Religious |
| 24.    | Aam         | Mangifera indica | Anacardiaceae | Fruit, Seed | Edible, Edible, medicinal |
| 25.    | Kem         | Mitragyna parviflora | Rubiaceae | Leafy branch | Cultural uses |
| 26.    | Munga       | Moringa pterygosperma Gaertn. | Moringaceae | Leaf, Fruit | Edible, Edible |
| 27.    | Anma        | Phyllanthus emblica | Euphorbiaceae | Leaf, Branch | Cultural uses |
| 28.    | Kanji       | Pongamia pinnata | Fabaceae | Fruit, Leaf | Edible, Medicinal, Cultural and medicinal |
| 29.    | Bijasa      | Pterocarpus marsupium Roxb. | Fabaceae | Stem | House construction, Furniture |
| 30.    | Kusum       | Schleichera trijuga Willd. | Sapindaceae | Fruit | Edible |
| 31.    | Bhelwa      | Semecarpus anacardium | Anacardiaceae | Fruit | Edible, Medicinal |
| 32.    | Sarei       | Shorea robusta Gaertn. | Dipterocarpaceae | Stem | House construction, Furniture, Fuel wood |
| 33.    | Guhlar/kullu | Sterculia urens | Sterculiaceae | Resin, Bark | Medicinal, Rope making |
| 34.    | Jamun       | Syzygium cumini | Myrtaceae | Stem, Fruit | Cultural, Edible, Cultural and medicinal |
| 35.    | Emli        | Tamarindus indica | Caesalpiniaeae | Fruit | Edible, Pickle preparation, Medicinal, Selling |
| 36.    | Sagarah     | Tectona grandis | Lamiaceae | Stem, Leaf | House construction, Furniture, Cultural, Dona making |
| 37.    | Arjan       | Terminalia arjuna | Combretaceae | Stem | Firewood, House construction |
| 38.    | Beheda      | Terminalia bellirica | Combretaceae | Fruit | Medicinal (Digestive) |
| 39.    | Harra       | Terminalia chebula | Combretaceae | Fruit | Medicinal (Digestive) |
| 40.    | Saja        | Terminalia tomentosa | Combretaceae | Stem | House construction, Fuel wood |

Table 4. Traditionally used Shrub species by local people in AABR.

| S. No. | Common name | Scientific name | Family | Parts used | Uses |
|--------|-------------|-----------------|--------|------------|------|
| 1.     | Ghughch     | Abrus precatorius | Fabaceae | Leaves | Mouth freshener |
| 2.     | Bans        | Bambusa bamboo | Poaceae | Seeds | mix into flour |
| 3.     | Chako       | Cassia tora | Caesalpiniaeae | Pod and seed | Vegetable |
| 4.     | Ratan jor   | Jatropha curcus | Euphorbiaceae | Seed, Whole plant | Substitute of candle, Bio-fencing |
| 5.     | Lantana     | Lantana camara | Verbenaceae | Ripe fruits, Whole plant | Edible, Bio-fencing |
| 6.     | Khajuri     | Phoenix sylvestris | Areaceae | Ripe fruits | Edible |
| 7.     | Mainhar     | Randia dumerorum | Rubiaceae | Leaf, Root | Vegetable, Medicinal |
| 8.     | Aranda      | Ricinthus communis | Euphorbiaceae | Seed | Oil |
| 9.     | Nirandia    | Vitex nigundo | Verbenaceae | Leaf | Medicinal |
| 10.    | Ber         | Zizipus zilopryus | Rhamnaceae | Fruit | Edible |
| 11.    | Aak         | Calotropia gigantia | Musaceae | Leaf & flower | Offer to god |
| S. No. | Common name | Scientific name | Family    | Parts used | Uses            |
|-------|-------------|-----------------|-----------|------------|-----------------|
| 12.   | Banana      | Musa paradisca   | Family    | Whole tree | Religious use   |
| 13.   | Mehandi     | Lawsonia irnemis | Lythraceae | Leaf       | Dye             |

**Figure 2.** Traditionally used flora of AABR for diverse usufructs by local people.

**Figure 3.** The utilization pattern of plant part used by local people of AABR.

**Figure 4.** Distribution of recorded ethnobotanical plants into different families.
Of the reported growth form of flora used by local people of AABR, tree & herbs make up the highest ratio of locally consumed species comprising 27.2% and 48.9% respectively (Figure 5). The present study on the traditional use of flora support by many earlier workers in India and elsewhere in world (Dlamini et al. 2011; Upretay et al. 2012; Panda, 2014; Dutta, 2015). Some of the studied floras are also used in Pachmarhi Biosphere Reserve and other parts of country (Sinha et al. 2005; Rout, 2007; Kala, 2009). Similar findings were laid by Bharucha et al. 2010, Dobriyal, et al, 2015. During the study we have observed that the products (forest) consumed or sold by these communities also have same use worldwide however, some of them are unique here, according to their (tribal’s) indigenous knowledge and traditional uses like religious use, use of plant according to food habit and medicinal use. During the survey it was also observed that the Baiga is most primitive tribal’s group of AABR and have enormous knowledge about the use of forest products. Due to modernization, like agriculture settlement (Pei et al. 2009), less interest of young generation (Panda, 2014) a drastic change in food styles (Negi et al. 2015) and very few documentation, the traditional knowledge remain in collective memory of the old faces and disappearing after the death of them.

| S.N | Local name | Scientific name | Culturally uses |
|-----|------------|-----------------|-----------------|
| 1   | Datura     | Datura metel    | Flower offer to god |
| 2   | Tulsi      | Ocimum sanctum  | Treated Prosperity of home |
| 3   | Bel        | Aegle marmelos  | Leaf offer to god |

Figure 5. Reported growth forms of flora used by local people of AABR.

3.1. Aboriginals Assist to Biodiversity Conservation and Climate Protection

Tribal communities play leading role in conservation of biodiversity through their vast knowledge about the use of concerned flora and also association of flora with their culture. The conservation specially in-situ addressed to climate protection everywhere in the world. Recently IPCC quoted that these are the communities which are in frontline of climate variability but due to their conservation tactics they easily takeoff from these variability. There are plenty of species which are conserved by them through their ritual association, due to their food habit and traditional value or commercial value of plants and principles of ethnoforestry among these communities (Table 6).
The forest products collected form forest or nearby village are sale in local or regional market by the local people of AABR (Table 7). The forest products play important role in the viability and survival of tribal and non-tribal communities of AABR. Forest dwellers of AABR collected these products from forest or nearby village area for household consumption and also for sale in the local market. Many wild edible plant species are found to be sold in the local markets particularly by poor and economically marginalized families, thereby generating a supplementary income to their household economy (Panda, 2014). Many earlier workers, worldwide also reported that forest is a source of subsistence of these isolated communities (Chittaranjan, 2005; Colchester et al. 2006; Muhammed et al. 2010; Khera, 2016). The important role of forest products is not only in meeting the subsistence needs but also in poverty alleviation (FAO, 1995). The forest products are very economically important in point of view of subsistence of local people of BR. In case of these indigenous communities, the major factor of economics such as production, consumption and distribution are closely associated with forest (Chittaranjan, 2005). These hidden societies of the word have great assumption that the natural resources have only means of survival of our lives. Utilization of forest resources is a prerequisite for the

### Table 6. List of species conserved on the name of god/goddess, on scared grooves and for edible purpose by tribal communities.

| S.No. | Local Name | Scientific name | Family Name | Remark |
|-------|------------|----------------|-------------|--------|
| 1     | Aam        | Mangifera indica | Anacardiaceae | Lord Vedhyadhara |
| 2     | Arjun      | Terminalia arjuna | Combretaceae | Lord Brhma |
| 3     | Nibh       | Citrus medica    | Rutaceae     | Lord Brahaspati |
| 4     | Bilva      | Aegle marmelos   | Rutaceae     | Lord Shiva |
| 5     | Nimba      | Azadiracta indica | Meliaceae   | Goddess Sheetla mata |
| 6     | Basil      | Ocimum sanctum   | Lamiaceae    | Goddess Lakshmi |
| 7     | Baka       | Seshania grandiflora | Fabaceae | Lord Narayan |
| 8     | Karavira   | Nerium indicum   | Apocynaceae  | Lord Ganesh |
| 9     | Nilapadma  | Nelumbi nucifera | Nymphaeaceae | Goddess Ambika |
| 10    | Madar      | Calotropis gigantean | Asclepiadaceae | Lord Shiva |
| 11    | Chirchita  | Acharanthas aspera | Amaranthaceae | Tender shoots as vegetable |
| 12    | Mohian leaf | Bauhinia purpurea | Ceasalpiniaceae | Leaves, flower, seeds as vegetable |
| 13    | Dudhia aru | Dioscorea alta    | Dioscoreaceae | Tubers used as vegetable |
| 14    | Pulas      | Butea monosperma | Fabaceae     | Conserved on scared grooves |
| 15    | Slai       | Boswellia serrata | Burseraceae  | Conserved on scared grooves |
| 16    | Madar      | Calotropis gigantean | Asclepiadaceae | Conserved on scared grooves |
| 17    | Bamboo     | Bambusa arundinacea | Poaceae | Conserved on scared grooves |
| 18    | Sargangnda | Ravnolafa serpentina | Apocynaceae | Conserved on scared grooves |
| 19    | Aam        | Mangifera indica | Anacardiaceae | Conserved on scared grooves |
| 20    | Peepal     | Ficus religiosa   | Moraceae     | Conserved on scared grooves |

Source: Jain, S.K. 1996. Ethnobiology in Human Welfare, Deep Publication, New Delhi.

### Table 7. Forest products sale locally or in regional market by local people of AABR.

| S No | Forest products | Season of collection | Duration (month) | Importance | Market value (in Rs.) | Multiple use of the product | Remark |
|------|-----------------|---------------------|------------------|------------|-----------------------|-----------------------------|--------|
| 1    | Sal leaf        | All season except leaf fall duration | 8 | Rs.15/1000 plates | X | 5 |
| 2    | Sal seed        | May-June            | 2 | Rs. 12/Kg | | 4 |
| 3    | Fuel wood mushroom | All season | 12 | Rs. 90/ bundle (4 Kg) | 3 |
| 4    | Mahua flower    | July- September     | 3 | Rs. 150-200/ kg | 1 |
| 5    | Bamboo kareel   | May-June            | 2 | Rs. 30- 40/ kg | 2 |
| 6    | Van karela      | Rainy season        | 3 | Rs. 70-80/ kg | 2 |
| 7    | (Momordica charantia) | Rainy season | 3 | Rs. 15-20/kg | 3 |
| 8    | mainah          | Rainy season        | 2 | Rs. 10-15/ kg | 3 |
| 9    | Uhar kuhar bhaji | All season          | 12 | Rs.15-20/ kg | 3 |
| 10   | Munga marina oliefera | Late summer to rainy season | 3-4 | Rs.10-15 | 3 |
| 11   | Murayya koenigii | All season          | 8-12 | Rs. 5-7/kg | 5 |
| 12   | Sal dhupa       | Rainy season        | 1-2 | Rs. 90-100/ kg | 1 |
| 13   | Bahania leaf    | Rainy season        | 3-4 | Rs. 12/ kg | 3 |
| 14   | Aonla fruit     | Late rainy season   | 2-3 | Rs. 30-40/ kg | 2 |
| 15   | Cassia tora     | Summer to late rainy season | 6-8 | Rs.15-20/ kg | 2 |

Data Source: Based on Questionnaire Survey of forest villagers of AABR.

*Rank: 1-Highly important, 2- Important 3-Moderately important, 4- Less important, 5- Very less important, according to market price*
livelhood of remote villagers who do not have many other alternative source of income (Yeo-Chang, 2009). Forest and forest resources, predominantly minor forest products (vegetables, fruit, medicinal, gum, fuel wood, seeds, grasses, and even soil) occupy an important role in continued existence of tribal’s life (Aboriginal communities) in AABR or elsewhere in world.

4. Conclusion

The results of this study has revealed that indigenous traditional knowledge on the use of flora like edible food, vegetables and cure to certain diseases is still practiced by the local communities of AABR. Beside, these uses the forest is also source of income, they sale some products in local or regional market. The local communities very well known to the uses of ethnobotanicals which are little known and unexplored to modern societies. So there is a strong need of documentation and conservation of these floras for as a source of food, medicine, and sustained income at a time of scarcity.

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