



The Productivity and Utilization of Non Wood Forest Products (NWFPs) under Agroforestry Systems for Rural Livelihood and Economy in Western Ghats Region of Karnataka (India)

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ARTICLE INFO

Received on : 17-04-2019
Accepted on : 25-06-2019
Published online : 09-07-2019

ABSTRACT

The Forest Department has also encouraged the conservation of these forest produces by the forming Village Forest Committees (VFCs) as a part of Joint Forest Planning and Management (JFPM). Under mechanism of benefit sharing, each village forest committee member has his/her share in NWFP of that area, thus the plants, which produce NWFPs, are being protected. The total proceeds derived from the sale of forest produce shall be shared between the Government and the VFC. Non Timber Forest Produces are shared with 10% to Government and 90% to VFC. Out of the share of the VFC, a minimum of 50% shall go to the Village Forest Development Fund (VFDF) and the balance will be shared by the members of the VFC as dividends or will go to the Village Development Fund (VDF) as decided by the VFC. Many of the NWFPs, which can be grown in the lands of farmers and natural forests as well. These will generate income and employment to the people. Many areas which are covered under waste lands can be improved by planting these plants, thus biodiversity of the plants in the area can be conserved. Moreover, quality of the produce grown in farms expected to be uniform and better. This is the right time to initiate and conduct Agroforestry activities for NWFP, which have the potential of changing the landscape of the country to a great extent.

KEYWORD

Non Timber Forest Products (NTFPs), Mechanism of benefit sharing, Village Forest Committees, Village Forest Development Fund (VFDF), Joint Forest Planning and Management (JFPM).

INTRODUCTION

India has diverse forest resources. The forests of the country include around 20.55% of the land area. Major part of the natural forest area in the state of Karnataka is in Western Ghats region. More than 80% of the total collection of NTFPs of state comes from this region. Western Ghats area in Karnataka comprises 21,756 sq. kms, which is one of the 18 biodiversity hot spots of the world. The Western Ghats together with the west coast, forms an important ecological region, springing from the Arabian sea coast to the mountain heights of over 2000m. The landscapes here are very heterogeneous.

The forests of the region provide wood, the timber of commerce; firewood apart from group of produces known as Minor Produces (MFP) or Non-Wood Forest Produces. Since the wood being considered as major forest produce, the produces of forest other than wood being considered as Minor Forest Produces or Non Wood Forest Produces (NWFPs).

Non Timber Forest Products (NTFPs) are the most sustainable source of revenue in lieu of the present scenario of restricted harvesting or no harvesting of trees, apart from Eco-tourism. Over 50% of the forest revenue and 70% of income from exports come from NTFPs and they provide 50% of income for 20-30% of the rural and tribal people in India (Theagarajan, 1994). In India, more than 30 million people are employed in NTEP sector (Masih et al., 2001). A large number of NTFPs are still handled by the forest contractors and only few NTFPs are nationalized. Despite acquiring a certain degree of marketing skills, the primary collectors have remained the lowest rung of NTFPs marketing either working as labourer on daily wages or being underpaid collectors. On gross return basis, the collector's share, on an average, in consumer's price has been estimated to be Rs. 32% to incase of dhup and kuru in Himachal Pradesh (Negi and Bhalla, 2002). The main reason being the market inefficiency crated due to lack of market information. Since the NTFPs are often sold in informal primary tribal weekly markets, information about prices, product flow, demand and supply pattern is less known (Masih et al., 2001).

The forests of Uttara Kannada district are abundant with so many Non Timber Forest Products such as *Sapindus laurifolia* (Antawala / Soapnut), *Vateria indica* (Dhoop), *Garcinia indica* (Murugalu), *Garcinia gummitatta* (Uppage), *Artocarpus lakoocha* (Vate), *Mangifera indica* (Mango), *Anacardium occidentale* (Cashewnut), etc. These NTFP trees are naturally grown in the betta lands and not planted by land holders, whereas cashew nut and mango trees are planted by betta holders and the yield from these trees is used only for house hold purposes.

The Non Wood Forest Produces have a vital role to play in the socio economic development of different communities in rural areas of our country. Many people who live in the Forests and nearby forests collect, process and market many of the Non Wood Forest Produces. These produces provide full or part time employment opportunities to large number of rural folk and supplement their income to a large extent. Some of the minor forest produces are collected, harvested and utilized locally and few others are exported to the neighboring states and even to other countries. These are essential for the livelihood and well being of rural communities. These produces narrow the gap between the people and forests.

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Now this concept of wood as major forest produces, needs a revision or change as the felling of green in the forest trees being stopped, the quantity/extent of timber extracted from the forests has decreased. The collection and harvesting of minor forest produces in the forests is not affected to the same extent as that of wood. These produces play a major role in meeting the requirements of society apart from earning revenue to the government and employment generation to the communities as both inside and around the forests.

The topography and climate of the tracts

The type of NWFPS available in the forests depend upon forest types. This area covers many hills, hillocks with altitude ranging from 250-1200 m. The average rainfall varies from 1500-4000 mm per year. The natural forest types of these tracts include evergreen, semi-evergreen and moist deciduous forests. The major crops grown by the farmers include rice, areca, coconut, coffee and other subsidiary crops like pepper, cardamom, ginger, cocoa, turmeric, vegetables and home remedial plants to some extent. The types of NTFPs and the plants that produce them have been listed in [Table 1](#).

The present system of procurement and harvesting of the produces

People and forests are interrelated. Forests are source of many utilities and serviced like environment pollution, soil erosion, water conservation. Forests also generate employment to the many people as a full time work and also part time work to utilize their leisure time to increase the meager income of the rural people.

The produces are disposed by open auction per Unit area of forest which is clearly described in the Tender Notification. The person who offers highest price usually have the right to collect or harvest NWFPS of that area for a prescribed period which is ordinarily for two years on contract. The contractors engage their persons to collect/harvest the produces generally under the supervision of Forest officials. After collection the produces require transit permits for the transporting them to markets. Though this is the procedure prescribed by the government, many of the produces are extracted/ harvested without the knowledge of the forest department. The contractors aim at maximum collection / procurement of the produces, with minimum extent of labour force applied. The contract labours are not generally trained in harvesting or collection. Since the contract period is limited for two years contractors are not interested in methods, leading decrease in proper harvesting quality. This destructive or improper method of harvesting has resulted in reduction of quality and quantity of NWFPS.

Role of agroforestry in the present situation

As agroforestry is a land use system including combination of Agriculture, Horticulture, Forestry, Animal husbandry which involves deliberate retention of trees, introduction of mixture of trees and woody perennials and other plants to benefit from resultant ecological and economic inter sections. There is a vast scope for planting of many of the plants (as mentioned in [Table-1](#)) in the lands of farmers and even betta lands (for each acre of Arecanut garden land, nine acres of forest lands are

being granted to the farmers known as betta land) of arecanut farmers which will supplement their income and improve the environment, and help to retain the biodiversity of the plants.

The principle of agroforestry in the of raising of tree species is already in practices. The planting of woody perennials on the field boundaries homesteads in front of temples and community is an age-ole tradition in our country. Many plants are invariably found in front of house, back yard of buildings and so on. The sacred plant thulasi (which has many medicinal properties) finds a place in front of almost every house in the village, similarly, woody perennials like mango, jack, champak, nagakesar, bael, (henna) Citrus species, Guava, Parijatha. Herbs like lemongrass, patchouli, Ginger, Artemisia, Coleus, Aloe, catheranthus, etc. to meet their own requirement as well as to supplement their income from the surplus produce they have grown. These plants also play some role in the traditional rituals of local communities. Apart from these few plants found as wild ones are also retained in farm lands. These include Bringraj (*Ecliptaalba*), Brahmi (*Centellaasiatica*), Sarpagand (*Rauwolfiaserpentina*), GouriHuvu (*Gloriosasuperba*), Gangarmanaballi / jyothosinnmathi (*Celasturspaniculatus*). The farms had the tradition of planting and conserving of some trees like Nagakesar (*Mesuaferrea*). Suragi (*Mammeasurgiana*) rarely Kedige / *Keorapandanus* species in and around the boundaries of their gardens of holding or in the blank or fallow areas. These are also found in the forests nearby, which are collected as NWFPS. Spices like Nutmeg, Cinnamon, Clove and Allspice and other useful plants like Soapunt (*Sapinduslaurifolius*), Shikakai, (*Acacia concinna*), Watehuli (*Arotocarpuslakoocha*), Muragala (*Garciniaindica*), Uppage (*Garciniagunmigutta*) and Tamarind (*Tamarindusindica*) are grown only some extent. These plants meet culinary purposes of the people and traditional home remedial practices ([Table 1 and 2](#)).

Some cash crops like Areca, coffee which gained much more importance in the recent past. Due to this, some of the above NWFPS Plants which have been planted and conserved by the locals remained uncared and destroyed in many cases. As the price of cash crops have come down also the local people who have earlier relied on allopathic medicines for the almost all of their requirements have experienced some of the side effects. Moreover, the cost of medicines is being found costly, as their cash crop did not realize the expected income. Hence, these people once again realized the importance of traditional herbal medicines from the plants cultivated and found around them.

People are convinced regarding importance of NWFPS found in their own land and surrounding forests. There is also rising awareness among the people regarding the importance of fast depleting plants in their own land and the forests around them. Once again people have started planting of the fast depleting NWFPS in their own fields. They have also improved the harvesting techniques and reckless collections of the produce which they have followed in the forest around them through the contractors. The Forest Department has also encouraged the conservation of these forest produces by the forming Village Forest Committees (VFCs) as a part of Joint

Forest Planning and Management (JFPM). Each village forest committee member has his/her share in NWFP of that area, thus the plants, which produce NWFPs, are being protected.

The method of disposal of forest produce and sharing pattern Mechanism of Sharing:

The total proceeds derived from the sale of forest produce shall be shared between the Government and the VFC as follows-

- 1. Non Timber Forest Produce:** 10% to Government and 90% to VFC
Out of the share of the VFC, a minimum of 50% shall go to the Village Forest Development Fund (VFDF) and the balance will be shared by the members of the VFC as dividends or will go to the Village Development Fund (VDF) as decided by the VFC.
- 2. Other Forest Produce-** : From the assets created with the help of VFC:
i. 25% to Government and ii. 75% to VFC
Out of the share of the VFC, a minimum of 50% will go to the VFDF and the balance will be shared by the members of the VFC as dividends or will go to the VDF as decided by the VFC.
- 3. From the assets created prior to formation of VFC** including older fuel wood, fodder and small timber plantations but excluding Teak plantations: i. 50% to Government ii. 50% to VFC
Out of the share of the VFC, a minimum of 50% will go to the VFDF and the balance will be shared by the members of the VFC as dividends or will go to the VDF as decided by the VFC.
- 4. From the natural growth** prior to formation of VFC excluding valuable species viz., Sandalwood, Rosewood, Teak, Honne, Matti and Nandi subject to the provision of Working Plan prescriptions: i) 50% to Government and ii) 50% to VFC

Out of the share of the VFC, a minimum of 50% is for the VFDF and the balance will be shared by the members of the VFC as dividends or will go to the VDF as decided by the VFC.

Many of the NWFPs, which can be grown in the lands of farmers and natural forests as well. These will generate income and employment to the people. Many areas which are covered under waste lands can be improved by planting these plants, thus biodiversity of the plants in the area can be conserved. Moreover, quality of the produce grown in farms expected to be uniform and better. This is the right time to initiate and conduct Agroforestry activities for NWFP, which have the potential of changing the landscape of the country to a great extent.

Marketing information of some important Non Wood Forest Products in Western Ghats Region of Karnataka

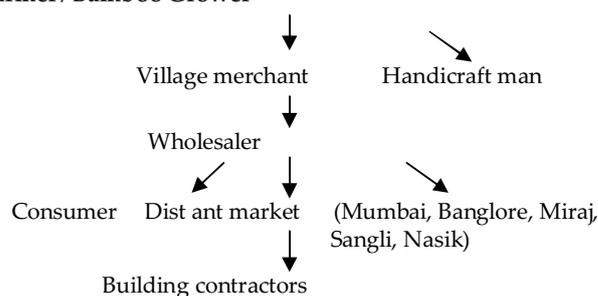
- 1. BAMBOO:** Bamboo is an important plant species from the grass family Gramineae/Poaceae; Bamboo has been and is still playing role in the socio – economy of the people especially in rural areas and constitutes in integral part of their culture. Bamboo called as “Bio – Steel”,

“Green Gold”, “Poor man's Timber” (Dhurga, 2013). Bamboos occupy 8.90 million ha area of forest land in India. About 135 species of bamboos including exotics are reported as available in India and *dendrocalamus strictus* constitute 45% of the growing stock.

Bamboo has more than 1500 documented uses and is widely used as paper and rayon manufacture, construction, architecture, engineering handicraft, food and medicine. The global market potential for bamboo is estimated at more than \$2 billion annually. Country's bamboo economy is expected to grow by over 15% to touch Rs. 260,000 million by 2015. The National Mission on Bamboo Technology and Trade Development under the Planning Commission, has estimated that if proper encouragement is given to bamboo cultivation and it's use, it can replace the projected import of timber to the tune of Rs.300,000 million in the next 20 years *i.e* 2025.

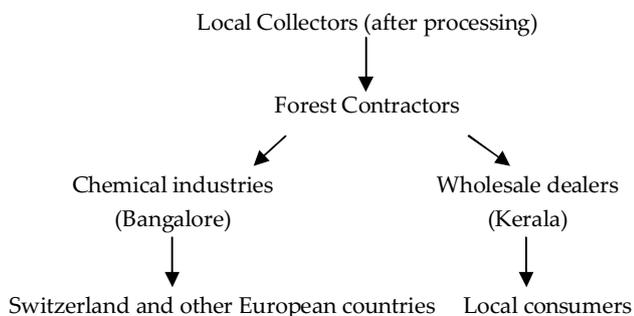
The country exports about Rs. 1000 million bamboo flooring materials and another flooring material of Rs. 1000 million is used domestically. It has been estimated that the total market size of bamboo flooring materials will rise to Rs. 19500 million by 2015. The demand for bamboo pulp is expected to grow to Rs. 20880 million by 2015 from Rs. 1000 million in 2001. The demand for bamboo furniture is expected to grow to Rs.32650 million in 2015 from Rs.3800 million in 2001. By 2015 bamboo scaffolding requirement will rise to Rs.8610 million and for housing purposes the demand will rise to Rs.11630 million. The demand for road construction will rise to Rs.2740 million and for bamboo grids the demand will be Rs. 1000 million. The demand for miscellaneous industry viz, ice cream sticks, firecrackers, bamboolathis and ladders will rise to Rs. 6000 million by 2004.

Farmer / Bamboo Grower



- 1. UPPAGE:** The fruits of *Garciniacambogia* (= *G. gummigutta*, Family; Clusiaceae = Guttiferae) are locally called as Uppage. Fruits are yellow in colour. It has thick rind with ridges. The fruit mature during June to August. Fruit contains 30% of Hydroxy Citric Acid (HCA), which is used as a bio-slimming agent. Traditionally, the fruit has been used as a substitute for tamarind in the study area and also in Kerala. It is also used in chemical industries and also as a medicine for rheumatism. Vinegar and black liquor is prepared from fruit is used in fish food preparation.

There was a huge demand for fruit during 1997 to 2000. The prices of fruit were Rs. 135-115 in 1997, Rs. 100-90 in 1999, Rs. 90-70 in 2000 and Rs. 30-35 in 2001. The sudden drop in the market price has disturbed the local NTFPs market and the collectors' economy (Girisha et al. 2002).



3. **KOKAM:** Kokam is the vernacular name for the soft drink prepared out of the rind of the fruit of *Garcinia indica* (Family: Clusiaceae). Fruit mature during April – May. One kg of fruit yield about 300g of rind which in turn will yield about one litre of kokam juice. Price of dried rind was Rs. 8-10 during 1994-95 and Rs. 30-40 per kg during 2000-2001.

Kokam juice in concentrated form is marketed under trade names such as Birinda, 5YES, etc. in the local market. Often the local soft drink companies market it without trade name. Each bottle of 150 ml. costs Rs. 3-4. The rind powder is also marketed in the brand 'Sapna'. Local market has a little contribution of kokam butter which is exported to Italy and other European countries.



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5. **SOAPNUT:** The fruit of *Sapindus trifoliatus* and *S. laurifolia* (Family: Sapindaceae) popularly known as soapnut. The pericarp of soapnut contains a chemical substance known as "saponin" which is an essential ingredient of soaps, detergents and other industrial products. Fruits have been traditionally used as detergents for washing clothes, hair, jewels, tarnished ornaments and fabrics. Fruit also has medicinal values and used for curing asthma, diarrhoea and tuberculosis. The fruit is marketed generally in three different grades. In fact, the collectors sell the ungraded, raw seeds to contractor at Rs. 6-8 per kg. The contractor after drying and cleaning divide them into three grades. Few collectors, grade the seeds and sell at better prices.

First grades fetches the highest price. Primary collectors are more benefited by selling I grade fruit than by selling III grade fruit.

The different grades are:

- I Grade : Large size, brown colour and shining fruits.
- II Grade : Medium size, brown colour fruit.
- III Grade : Small size, blackish brown colour and shiningless.

6. **NUTMEG:** Seeds and arils of *Myristicamalabarica*, *M. dactyloides*, *M. fatua* and *M. fragrans* (Family Myristicaceae) are important products used in the local market. The first two are indigenous and the last two are introduced. A very low quantity of aril is obtained from each fruit. The average nut to aril ratio after drying is only 0.16. Seeds are sold at lower prices but, the arils fetch a very price. Hence, the tribal and local people collect almost all available seeds and aril and sell it in the weekly market or to businessmen or the local spice shop owners. The aril then will be sold at 176-217 per cent higher prices.

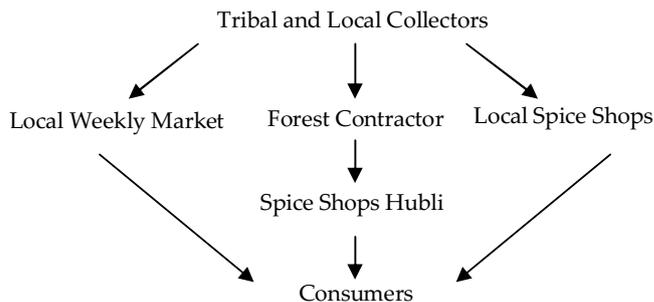


Table 1: Types of forest produces found in the natural forests/cultivated in the tract

Sl. No.	Types of NTFPs	Plants that yield NTFPs	Remarks
1	Leaves	<i>Cinnamomum spp.</i> (Dalchini), <i>Butea monosperma</i> (plalas), <i>Corypha umpraculifera</i> (Talipot palm)	Found in natural forests
2	Gums, resins	<i>Lannea coramandelica</i> , <i>Pterocarpus marsupium</i> , <i>Canarium structum</i> , <i>Veteria indica</i> , <i>Hopea odorata</i> , <i>Ailanthus malabaricum</i> , <i>Dipterocarpus spp.</i> <i>Kingiodendronpinnatum</i> , <i>Garciniamorella</i> ,	Found in natural forests
3	Oil seeds	<i>Pongamia glabra</i> , (Karanj, Honge), <i>Madhuca indica</i> , (Mohua, ippel), <i>Mangifera indica</i> (Mango)	Mango found in wild as well as us cultivated.
4	Essential oils	Lemon grass, Citronella grass, Palm rosagrass (Leaf grass), Khus grass, (Roots), <i>Eucalyptus citriodora</i> (Leaves), <i>Mammea spp.</i> (flower bunds).	Grasses are cultivated by farmers.
5	Fibres and flosses	<i>Bombax malabarica</i> , (semal, buruga), <i>Ceiba pentandra</i> , (Kapok), <i>Sterculia villosa</i> , <i>Agave species</i> , <i>Ananas cosmosus</i> .	Ananas is cultivated
6	Drugs and spices	<i>Myristica fragrans</i> , <i>M. malabarika</i> , <i>Zanthoxylum rhetsa</i> , <i>Mesua ferrea</i> (Nagkesa) <i>Z. ovalifolium</i> , <i>Cinnamomum spp.</i> (fruits and bark) <i>Piper nigrum</i> , <i>P. longum</i> , <i>Asparagus racemosus</i> , <i>Artemisia sp</i> , <i>Rauwolfia serpentina</i> , <i>Caesaria esculenta</i> , <i>Mesua ferrea</i> , <i>Gymnema sylvestre</i> , <i>Apama siliqua</i> , <i>Terminalia bellirica</i> , <i>T. chebula</i> , <i>Phyllanthus emblica</i> , <i>P. niruri</i> , <i>Centellaasiatica</i> , <i>Coleus species</i> .	Almost all are from the natural forests except <i>Artemisia spp.</i> <i>Coleus</i> and <i>Myristicafragrans</i> .

Sl. No.	Types of NTFPs	Plants that yield NTFPs	Remarks
7	Edible produces	<i>Garcinia indica</i> , (Kokum), <i>Garcinia gummi-gutta</i> , (Uppage, Punarpuli), <i>Artocarpus lakucha</i> , (wate), <i>Carissa caranda</i> , (Kavalikai), <i>Mangifera indica</i> , (Mango), <i>Zigypus species</i> . (Wild ber), Young bamboo culms, Edible mushrooms, Many other plants.	Partly cultivated partly are from natural forests.
8	Bamboos and canes	<i>Bambusa arundinacea</i> , <i>Dendrocalamus strictus</i> , <i>Oxytenanthera stocksii</i> , <i>Ochlandra reedii</i> , <i>Calamus rotang</i> , <i>C. flagellum</i>	Mainly wild ones except <i>Oxytenanthera stocksii</i>
9	Detergents	<i>Acacia concinna</i> , (Shikakai), <i>Sapindus laurifolius</i> , (soap nut).	Partly cultivated
10	Animal products	Honey and wax	Partly collected from forests.

Table 2: Oil bearing plants with regions suitable for cultivation

Sl.	Scientific name	Common name	Regions suited for cultivation
1.	<i>Vateria indica</i>	Dhupa	Western Ghats, Maharashtra, Kerala.
2.	<i>Simmondsiasinensis</i>	Jojoba	Rajasthan, Gujarat.
3.	<i>Pongamia glabra</i>	Karanja	River streams throughout India.
4.	<i>Sohleichera oleosa</i>	Kusum	Dry areas of Uttar Pradesh, Bihar and Orissa.
5.	<i>Garcinia indica</i>	Kokum	Western Ghats, Maharashtra, Kerala.
6.	<i>Acrocomia sclerocarpa</i>	Macauba,	Madhya Pradesh, Orissa, Deccan Plateau, Andaman and Western Ghats.
7.	<i>Mesua ferrea</i>	Nahor	Assam, Himalayan, Andaman and Western Ghats.
8.	<i>Butea monosperma</i>	Flame of the Forest, Palah	Uttar Pradesh, Tamil Nadu, Orissa, Maharashtra, Karnataka, Bihar and Andhra Pradesh.
9.	<i>Salvadora oleoides</i>	Pilu	Dry desert areas, Uttar Pradesh, Punjab, Rajasthan, Gujarat and Madhya Pradesh.
10.	<i>Jatropha curcas</i>	Ratanjyoth	Assam, Madhya Pradesh, Bihar, Orissa, Andhra Pradesh, Karnataka.
11.	<i>Caryocar brasiliense</i>	Pigui	Throughout India.
12.	<i>Actinodaphne hookeriana</i>	Pisa	Hill slopes of Sikkim, Western Ghats, Orissa, Konkan.
13.	<i>Astrocaryum tucuma</i>	Tacuma	Assam, Karnataka and Madhya Pradesh
14.	<i>Calophyllum inophyllum</i>	Undi	Western Ghats, Maharashtra, Kerala and Andaman.

Table 3: Some oil yielding plants with oil content (in per cent)

Sl. No.	Botanical name	Oil content (%)	Sl. No.	Botanical name	Oil content (%)
1.	<i>Aphanamixes polystachya</i>	47	13	<i>Hydnocarpus laurifolia</i>	63
2.	<i>Argemone mexicana</i>	22-36	14	<i>Jatropha curcas</i>	35-40
3.	<i>Azadirachta indica</i>	35-40	15	<i>Litsea glutinosa</i>	35-51
4.	<i>Bombax ceiba</i>	20	16	<i>Madhuca indica</i>	30-35
5.	<i>Caesalpinia bonducella</i>	20	17	<i>Mallotus philippinensis</i>	35

Sl. No.	Botanical name	Oil content (%)	Sl. No.	Botanical name	Oil content (%)
6.	<i>Calophyllumelatum</i>	70	18	<i>Minusopselengi</i>	16-25
7.	<i>Cannabis sativa</i>	32-35	19	<i>Perrillafrutescens</i>	35-51
8.	<i>Dapbnepapyraceae</i>	36	20	<i>Pongamiapinnata</i>	30-35
9.	<i>Diplokhemabutyraceae</i>	42-47	21	<i>Prisepiautilis</i>	37
10	<i>Garciniaechinocarpa</i>	49.6	22	<i>Simaroubaglauca</i>	30-35
11	<i>Gynordiaodorata</i>	27	23	<i>Terminaliachebula</i>	36
12	<i>Holarrhenaantidysentirica</i>	19-30			

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