

Survey for NTFP plants of the Gorumara National Park in the Jalpaiguri district of West Bengal (India)

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Abstract

Gorumara National Park (GNP) is one of the most important protected areas in Duars of West Bengal. It is marketed for its tourism and natural products potential. A total 334 of NTFP species of plants has been recorded through the present survey, which include 57 edible plants, 164 medicinal plants, 45 species used in veterinary medicine, 20 species use as various religious purposes, 19 species for poisonous substances, 54 as fuel and 260 species used as fodder by the forest villagers.

Key word: Gorumara National Park, NTFPs.

INTRODUCTION

Wild plants have always been an important component of healthcare throughout the human history (Pushpangadan 2002; Toksoy *et al.* 2010; Saha *et al.* 2013). Non-Timber Forest Produces (NTFPs) are an integral part of sustainable development and survival for the forest villagers. According to Wickens (1994), the potential economic value of NTFPs and their utilization or their market value is often underestimated. NTFPs are important tools for decreasing poverty for the marginalized and forest dependent communities through contributing to livelihoods, food security, income, health and sustainable human development (Ahenkan & Boon 2008; Sarkar 2014). Approximately 350 million people of the third-world depend on NTFPs as their primary source of income, food, nutrition, and medicine (UNDP 2004; FAO 2005). The significance of NTFPs in rural livelihood has been established (Sarkar 2014), but only little is known about their collection and marketing dynamics (Pandit *et al.* 2004). In India, there are over 15,000 species of higher plants out of which nearly 3000 species (20 %) yield NTFPs, of those only about 126 species (0.8 %) have been commercially developed (Maithani 1994, Basu *et al.* 2013). Rural population specially forest dwellers in India depend on the forests not only to supplement their domestic requirements for foods, fodder and medicines but also to supplement their incomes by selling part or all of their collections in local markets (Basu *et al.* 2013). In India, more than 41 million tribals and forest dwellers harvesting natural product from the forests areas and they consume about 60 % of collected NTFPs for personal use (Prasad 1985). Primarily NTFPs include fodder, dry and fallen twigs and branches, leaves and where available mushrooms, edible tubers, flowers, fruits and medicinal herbs (Pandit *et al.* 2004; Sarkar 2014). In addition, local communities do not get the full incomes they often get only collection charges even for products that have a very high market value (Basu *et al.* 2013).

Study Area

Gorumara National Park (GNP) was established with 2 Ranges, Gorumara North and Gorumara South covering 7 beats. The areas lying around 88° 45' 19" E to 88° 51' 18" E Longitude and 26° 48' 05"N to 26° 41' 20" N Latitude. All Eco-Development Committees are giving protection of this forest as part of their agreement with the Forest Department (FD) during the implementation of Joint Forest Management (JFM) program (Sarkar *et al.* 2009). Murti, Jaldhaka, Garati and Indong are the main rivers passing through this important Protected Area (Saha *et al.* 2013). The entire forest tract of GNP comes under the North Indian moist tropical forest type in Champion & Seth's (1968) classification. Average elevation of the study area is 90 m and chiefly covered with alluvial soil; average annual rainfall is 375 cm and monthly average temperature ranges between 15° C to 32° C (Sarkar *et al.* 2009).

METHODOLOGY

First hand information regarding the NTFPs harvesting and their uses were gathered through interactions with tribal people in local forest villages. Further interactions with local *Baidyas* were also helpful to gather information regarding commonly used medicinal plants. During interactions, prepared semi-structured questionnaire (NTFPs Datasheet) was used following Jain (1995), Sarkar (2011) and Sarkar (2014). After this, detailed survey was conducted in the local markets surrounding the forest areas, *Banaja* (Govt. NTFP-shop) and recorded data from different forest offices taking care of GNP and the FD-website (http://www.ntfpwestbengal.in/important_downloads.php).

Plant specimens were processed following Jain & Rao (1977), identified in the Taxonomy and Environmental Biology Laboratory of the Department of Botany, North Bengal University, matched at CAL and NBU and finally deposited at NBU.

RESULT AND DISCUSSION

From the present study, 334 species of plants were recorded to have NTFP values. Recent survey showed that 58 species of edible plants are growing in the GNP, 164 species (27% of total) used as ethnomedicinal and 45 species (7%) as ethnoveterinary plants; 20 species of plants used by the forest villagers in their regular ritual and religious purposes; 19 species of plants they used as poison for catching fishes from rivers and ponds and for hunting birds. GNP is very rich in fodder for Elephants, bison, pigs, different species of seer etc. But, the forest villagers collect only 260 species of plants for their cattle. The villagers regularly collect 54 species as fuel for cooking. All the recorded plants has been numerically summarized in Table 1 and Fig. 1.

Table 1. Number of different categories of NTFPs plants from GNP

Total no. of NTFPs	Medicinal	Veterinary	Edible	Fodder	Religious	Poisonous	Fuel
334	164	45	58	260	20	19	54

The villagers use the wood of so many species as fuel in cooking their daily food. But, their regular practice of fuel collection covers very nominal number (only 9%) of the recorded species. In case of fodder plants, they collect regularly very less number (only 42%) of plants (Fig. 1). This recorded number is based on the present field survey on their regular practice, though the total number of fodder plants is very high in the forest area.

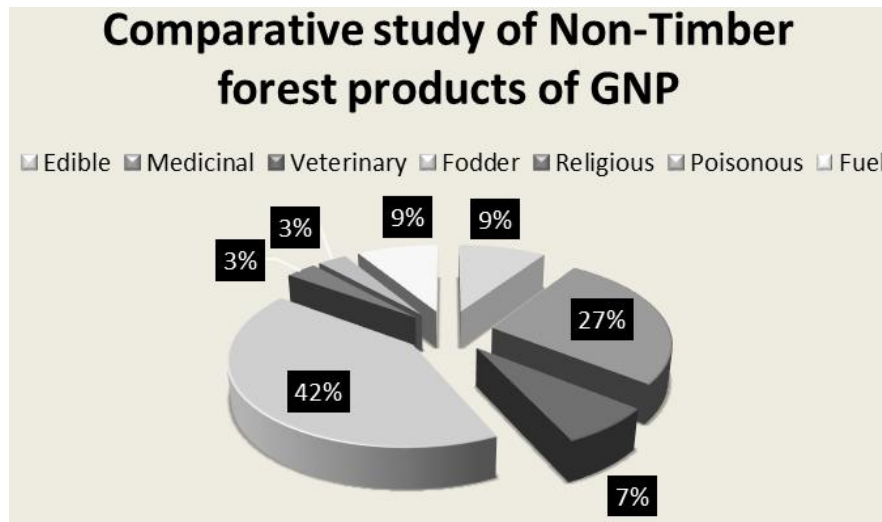


Fig. 1. Percentage of different use groups of recorded NTFPs from Gorumara National Park

The forest villagers collect 334 species of plants from Gorumara National Park, but all these species are not for their own consumption. A little amount of the recorded NTFPs are placed in the commercial market though agents or local buyers. Government forest division also harvest NTFPs for commercial purposes and they process those for marketing. So, the Government has prepared a list of NTFPs and their prices that is available in http://www.ntfpwestbengal.in/important_downloads.php. But, the local collectors recruited by public agents are always exploited by the agents and/or buyers. So, the price remain very low than the Government approved rates. The comparative price list from the local market survey of some commercial NTFPs are given in Table 2.

Table 2. Recorded marketable NTFPs from GNP along with their price in local market vis-à-vis in government circular.

Commercial NTFPs Plants [Family]; Local name; Voucher specimen (Goutam & AP. Das nos.)	NTFP Part	Use type	End Product	Local Market Value		Government Value	
				Qty	Rate (Rs.)	Qty	Rate (Rs.)
<i>Adenanthera pavonina</i> Linnaeus [Fabaceae : Mimosoidae]; <i>Chandan bichi</i> ; Bichha bhanga, 758	Seed	Decorat-ion	Showpiece	1 Kg	40	-	-
<i>Aegle marmelos</i> (Linnaeus) Corrêa [Rutaceae]; <i>Bel</i> ; Khunia, 70	Fruit	Dry/Churna	Medicine	1 pc	10	1kg	450
<i>Alstonia scholaris</i> (Linnaeus) R. Brown [Apocynaceae]; <i>Chhatim</i> ; Indong, 117	Bark	Dry	Medicine	1kg	40	-	-
<i>Alternanthera sessilis</i> (Linnaeus) R. Brown ex de Candolle [Amaranthaceae]; <i>Chhenchi saag</i> ; Khunia, 222; Murti, 542	Whole plant	Fresh	Vegetable	250g	5	-	-
<i>Amaranthus viridis</i> Linnaeus [Amaranthaceae]; <i>Notey</i> ; Khunia, 131	Whole plant	Fresh	Vegetable	250g	5	-	-
<i>Andrographis paniculata</i> (Burman f.) Nees [Acanthaceae]; <i>Kalmegh</i> ; Budhiram 1123	Whole plant	Dry/Churna	Medicine	250g	80	100 g	45
<i>Aristolochia indica</i> Linnaeus [Aristolochiaceae]; <i>Ishwarmul</i> ; Bichha Bhanga, 783	Root	Dry	Medicine	250g	100	-	-
<i>Artemisia indica</i> Willdenow [Asteraceae]; <i>Nagnishinda/ Titepati</i> ; Khunia, 125	Whole plant	Dry	Medicine	1kg	70	-	-
<i>Artocarpus heterophyllus</i> Lamarck [Moraceae]; <i>Kanthal</i> ; Budhiram, 761	Fruit	Fresh	Edible	1pc	5-10	-	-
<i>Asparagus racemosus</i> Willdenow [Asparagaceae]; <i>Shatamuli</i> ; Khunia, 32	Root	Dry/Churna	Medicine	250g	100	100 g	75

Commercial NTFPs Plants [Family]; Local name; Voucher specimen (<i>Goutam & AP. Das nos.</i>)	NTFP Part	Use type	End Product	Local Market Value		Government Value	
				Qty	Rate (Rs.)	Qty	Rate (Rs.)
<i>Bambusa balcooa</i> Roxburgh [Poaceae]; <i>Boro Bansh</i> ; Murti, 419	Culm	Fresh	Household	1pc	60	-	-
<i>Bambusa tulda</i> Roxburgh [Poaceae]; <i>Talda Bansh</i> ; Gorumara, 931	Culm	Fresh	Household	1pc	60	-	-
<i>Bambusa vulgaris</i> Schrader [Poaceae]; <i>Holud Bansh</i> ; Gorumara, 924	Culm	Fresh	Decoration	1pc	55	-	-
<i>Bauhinia purpurea</i> Linnaeus [Caesalpiniaceae]; <i>Kanchan</i> ; Dhupjhora, 97	Bark	Dry	Medicine	250g	25	-	-
<i>Bombax ceiba</i> Linnaeus [Malvaceae]; <i>Simul</i> ; Murti, 335	Bark	Dry/Churna	Medicine	250g	60	80g	75
<i>Cannabis sativa</i> Linnaeus [Cannabaceae]; <i>Bhang</i> ; Khunia, <i>Goutam & AP. Das 65</i>	Leaf	Dry	Intoxication	250g	5	-	-
<i>Cassia fistula</i> Linnaeus [Fabaceae]; <i>Bandarlathi</i> ; Murti, 349	Bark	Dry	Medicine	250g	25	-	-
<i>Castanopsis indica</i> (Roxburgh ex Lindle) A. De Candolle [Fagaceae]; <i>Kathbadam</i> ; Murti, 352	Fruit	Dry	Showpiece	1kg	15	-	-
<i>Centella asiatica</i> (Linnaeus) Urban [Apiaceae]; <i>Thankuni</i> ; Murti, 313	Leaf	Churna	Medicine	-	-	100g	45
<i>Chenopodium album</i> Linnaeus [Amaranthaceae]; <i>Bethua</i> ; Dhupjhora, 663	Whole plant	Fresh	Vegetable	250g	5	-	-
<i>Cinnamomum bejolghota</i> (Buchanan – Hamilton) Sweet [Lauraceae]; Murti, 452	Bark	Dry	Agarbatti	1kg	20	-	-
<i>Citrus limon</i> (Linnaeus) Osbeck [Rutaceae]; <i>Lebu</i> ; Khunia, 44	Fruit	Fresh	Edible	4pcs	10	-	-
<i>Citrus maxima</i> (Burman) Merrill [Rutaceae]; <i>Jambura</i> ; Khunia, 42	Fruit	Fresh	Edible	1pc	5	-	-
<i>Coccinia grandiflora</i> Cogniaux ex Engler [Cucurbitaceae]; <i>Telakucha</i> ; Gorumara, 719	Whole plant	Fresh	Vegetable	250g	10	-	-
<i>Colocasia antiquorum</i> Schott [Araceae]; <i>Panikochu</i> ; Khunia, 134, 202	Corm	Fresh	Vegetable	1kg	10	-	-
<i>Dillenia indica</i> Linnaeus [Dilleniaceae]; <i>Chalta</i> ; Murti, 373	Ripe Fruit	Fresh	Edible	1pc	3	-	-
<i>Dioscorea alata</i> Linnaeus [Dioscoreaceae]; <i>Chuprialu</i> ; Gorumara, 652	Bulbil, root-stock	Fresh	Vegetable	1kg	10	-	-
<i>Dioscorea bulbifera</i> Linnaeus [Dioscoreaceae]; <i>Chuprialu</i> ; Gorumara, 653	Bulbil, root-stock	Fresh	Vegetable	1kg	10	-	-
<i>Dioscorea deltoidea</i> Grisebach [Dioscoreaceae]; <i>Chupri alu</i> ; Gorumara, 702	Bulbil, root-stock	Fresh	Vegetable	1kg	10	-	-
<i>Dioscorea pentaphylla</i> Linnaeus [Dioscoreaceae]; <i>Pachpata alu</i> ; Gorumara, 656	Bulbil, root-stock	Fresh	Vegetable	1kg	10	-	-
<i>Dioscorea prazeri</i> Prain & Burkill [Dioscoreaceae]; <i>Kham alu</i> ; Khunia, 190; Dhupjhora, 643	Bulbil, root-stock	Fresh	Vegetable	1kg	10	-	-
<i>Elaeocarpus floribundus</i> Blume [Elaeocarpaceae]; <i>Jalpai</i> ; Dhupjhora, 978	Fruits	Fresh	Edible	1kg	12	-	-
<i>Entada rheedii</i> Sprengel [Fabaceae]; <i>Gila</i> ; Dhupjhora, 166	Seed	Dry	Medicine	1kg	70	-	-
<i>Enydra fluctuans</i> de Candolle [Asteraceae]; <i>Helancha</i> ; Dhupjhora, 164	Whole plant	Fresh	Vegetable	250g	5	-	-
<i>Glinus oppositifolius</i> (Linnaeus) A. de Candolle [Molluginaceae]; <i>Gima</i> ; Khunia, 069	Whole plant	Fresh	Vegetable	250g	10	-	-
<i>Holarrhena pubescens</i> Wallich ex G. Don [Apocynaceae]; <i>Kuchila</i> ; Gorumara, 627	Bark	Dry	Medicine	1kg	30	-	-
<i>Holmskioldia sanguinea</i> Retzius [Lamiaceae]; Murti, 365	Calyx	Dry	Decoration	100g	5	-	-

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<i>Houttuynia cordata</i> Thunbergh [Saururaceae]; <i>Ashtani</i> ; Murti, 357	Whole plant	Dry	Medicinal	250g	20	-	-
	Whole plant	Fresh	Chatni/ Vegetable	500g	10	-	-
<i>Ipomoea aquatica</i> Forsskal [Convolvulaceae]; <i>Kolmi</i> ; Khunia, 064	Whole plant	Fresh	Vegetable	500g	10	-	-
<i>Justicia adhatoda</i> Linnaeus [Acanthaceae]; <i>Basak</i> ; Indong, 112	Leaf	Dry/Churna	Medicine	100g	10	100g	45
<i>Justicia gendarussa</i> Burman f. [Acanthaceae]; Dhupjhora, 171	Leaf	Dry	Medicine	100g	8	-	-
<i>Lagerstroemia parviflora</i> Roxburgh [Lythraceae]; <i>Sidha</i> ; Gorumara, 697	Fruit	Dry	Decoration	1kg	15	-	-
<i>Lagerstroemia speciosa</i> (Linnaeus) Persoon [Lythraceae]; <i>Jarul</i> ; Gorumara, 994	Fruit	Dry	Decoration	1kg	15	-	-
<i>Lasia spinosa</i> (Linnaeus) Thwaites [Araceae]; <i>Kantakochu</i> ; Gorumara, 648	Spadix/ Inflorescence	Fresh	Vegetable	1pc	3	-	-
<i>Litchi chinensis</i> Sonnerat [Sapindaceae]; <i>Lichu</i> ; Gorumara, 1377	Fruit	Fresh	Edible	1kg	30	-	-
<i>Mangifera indica</i> Linnaeus [Anacardiaceae]; <i>Aam</i> ; Budhram, 1103	Fruit	Fresh	Edible	1kg	25	-	-
<i>Manihot esculenta</i> Crantz [Euphorbiaceae]; <i>Shimularul</i> ; Murti, 367	Root	Fresh	Eaten boiled	1kg	15	-	-
<i>Momordica charantia</i> Linnaeus [Cucurbitaceae]; <i>Uchchhe</i> ; Dhupjhora, 177	Fruit	Fresh	Vegetable	1kg	10	-	-
<i>Momordica dioica</i> Roxburgh ex Willdenow [Cucurbitaceae]; <i>Kakrol</i> ; Murti, 383	Fruit	Fresh	Vegetable	1kg	8	-	-
<i>Morinda angustifolia</i> Roxburgh [Rubiaceae]; <i>Haldikath</i> ; Murti, 391	Stem	Dry/ Churna	Medicine	-	-	1kg	35
<i>Morus indica</i> Linnaeus [Moraceae]; <i>Tur</i> ; Murti, 359	Fruit	Fresh	Edible	100g	5	-	-
<i>Mucuna pruriens</i> (Linnaeus) De Candolle [Fabaceae : Faboideae]; <i>Bandarchulka</i> ; Gorumara, 645	Seed	Dry/ Churna	Medicine	100g	30	100g	75
<i>Musa balbisiana</i> Colla [Musaceae]; <i>Bicha Kala</i> ; Murti, 392	Fruit	Fresh	Vegetable	4pcs	12	-	-
	Inflorescence	Fresh	Vegetable	1pc	10	-	-
<i>Ocimum tenuiflorum</i> Linnaeus [Lamiaceae]; <i>Tulsi</i> ; Dhupjhora, 198	Leaf	Dry/ Churna	Tulsi Tea	-	-	100g	45
<i>Oroxylum indicum</i> (Linnaeus) Kurz [Bignoniaceae]; <i>Totala</i> ; Khunia, 63	Seed	Dry	Decoration	10g	40	-	-
<i>Paederia foetida</i> Linnaeus [Rubiaceae]; <i>Gondhopata</i> ; Dhupjhora, 199	Leaf	Dry/ Churna	Medicine	-	-	100g	45
<i>Phlogacanthus thyriformis</i> (Roxburgh ex Hardwicke) Mabberley [Acanthaceae]; <i>Rambhang</i> ; Murti, 327	Leaf	Dry	Medicine	100g	15	-	-
<i>Phyllanthus emblica</i> Linnaeus [Phyllanthaceae]; <i>Amlaki</i> ; Dhupjhora, 180	Fruit	Dry/ Churna	Trifala/ Medicine	-	-	100g	45
	Fruit	Fresh	Edible	1kg	25	-	-
<i>Piper betloides</i> Chaveer & Tanomtong [Piperaceae]; <i>Bhote Pan</i> ; Gorumara, 674	Leaf	Fresh	Edible	32 leaves	8	-	-
<i>Piper longum</i> Linnaeus [Piperaceae]; <i>Pipul</i> ; Murti, 393	Fruit	Dry	Medicine	100g	10	100g	25
<i>Piper peepuloides</i> Roxburgh [Piperaceae]; <i>Pipul</i> ; Dhupjhora, 181	Fruit	Dry	Medicine	100g	10	-	-
<i>Psidium guajava</i> Linnaeus [Myrtaceae]; <i>Peyara</i> ; Budhira, 1238	Fruit	Fresh	Edible	1kg	10	-	-
<i>Rauvolfia serpentina</i> (Linnaeus) Bentham ex Kurz [Apocynaceae]; <i>Swarpagandha</i> , <i>Chando</i> ; Gorumara, 638	Root	Dry	Medicine	1kg	180	-	-

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				Qty	Rate (Rs.)	Qty	Rate (Rs.)
<i>Sapindus rarak</i> De Candolle [Sapindaceae]; <i>Ritha</i> ; Budhira, 1257	Fruit	Dry/Churna	Hair fresh	-	-	100 g	45
	Fruit	Fresh	Hair wash	1kg	25	-	-
<i>Shorea robusta</i> Gaertner [Dipterocarpaceae]; <i>Sal</i> ; Gorumara, 637	Resin	Dry	Sal Dhup	500g	50	100 g	15
<i>Sterculia villosa</i> Roxburgh [Malvaceae]; <i>Odal</i> ; Budhira, 1245	Fruit	Dry	Decoration	1kg	18	-	-
<i>Syzygium cumini</i> (Linnaeus) Skeels [Myrtaceae]; <i>Jam</i> ; Dhupjhora, 188	Seed	Dry	Medicine	-	-	100 g	4
	Fruit	Fresh	Edible	1kg	15	-	-
<i>Syzygium jambos</i> (Linnaeus) Alston [Myrtaceae]; <i>Golabjaam</i> ; Bichha Bhanga, 1257	Fruit	Fresh	Edible	1kg	15	-	-
<i>Terminalia arjuna</i> (Roxburgh ex De Candolle) Wight & Arnott [Combretaceae]; <i>Arjun</i> ; Dhupjhora, 1412	Bark	Dry/Churna	Medicine/Arjun Tea	1kg	60	100 g	45
	Fruit	Dry	Decoration	1kg	10	-	-
<i>Terminalia bellirica</i> (Gaertner) Roxburgh [Combretaceae]; <i>Kathbadam</i> , <i>Boira</i> ; Murti, 376	Fruit	Dry/Churna	Medicine/Trifala	1kg	200	100 g	45
<i>Terminalia chebula</i> Retzius [Combretaceae]; <i>Haritaki</i> ; Murti, 360	Fruits	Churna	Medicine/Trifala	1kg	200	100 g	45
<i>Thysanolaena latifolia</i> (Roxburgh ex Hornemann) Honda [Poaceae]; <i>Jharu</i> ; Gorumara, 636	Whole plant & Inflorescence	Dry	Jharu	1 jharu	10	-	-
<i>Tinospora crispa</i> (Linnaeus) Hooker f. & Thomson [Menispermaceae]; <i>Gulancga</i> ; Dhupjhora, 189	Stem	Dry/Churna	Medicine	-	-	100 g	75
	Stem	Fresh	Medicine	1kg	90	-	-
<i>Vitex negundo</i> Linnaeus [Lamiaceae]; <i>Nishinda</i> ; Budhira, 1249	Leaf	Dry/Churna	Medicine	-	-	100 g	45
<i>Ziziphus jujuba</i> Miller [Rhamnaceae]; <i>Kul</i> ; Dhupjhora, 195	Fruit	Fresh	Edible	1kg	10	-	-

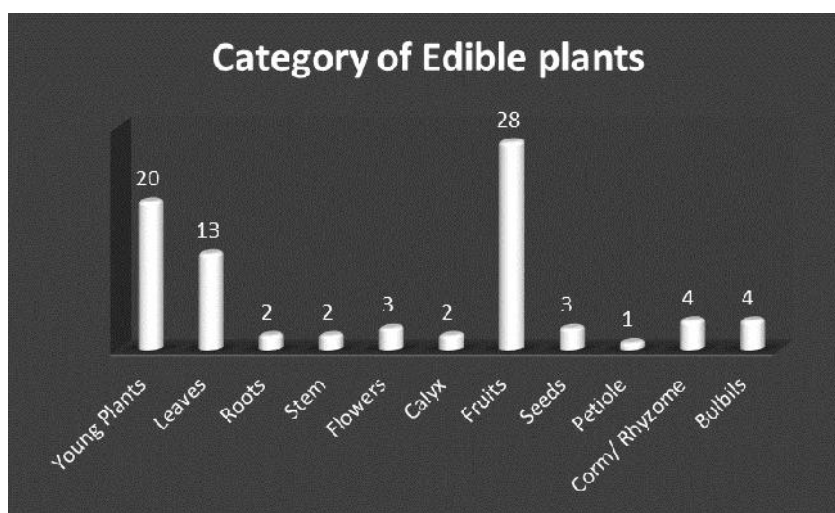


Fig. 2. Numerical classification of edible plant parts recorded from GNP

A total of 58 species of edible plants (commercial and non-commercial) has been recorded from the present survey in GNP. Of these 28 species of fruits are consumed by the forest villagers directly or as vegetable. 20 species of young plants or plant twigs are used mainly as vegetables, and 13 species are used as leafy vegetables (Fig. 2).

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