
**STUDY OF CANE (RATTAN) RICH POCKETS OF BASTAR FORESTS DIVISION IN
CHHATTISGARH STATE****SAJIWAN KUMAR***

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Abstract**Keywords:**

Rattan;

Kanger Valley National Park;

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Utilization;

Jaithgiri forest;

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Bastar.

Rattan is a non-wood forest resource in Bastar forests remains largely unexplored. To create schedule for unlocking its potentials, this study investigates, its availability, distribution and current utilization pattern found in Kutumsar cave, Kanger Valley National Park, Ganesh Bahar nala, Machkot forest range and Jaithgiri Markhandi nala Bakawand forests range at Bastar forest division of Chhattisgarh state. The study entitled "Study of Cane (Rattan) rich pockets of Bastar Forest division in Chhattisgarh state" was carried out during year 2015. Observations were collected using structured questionnaire and on-the-spot-assessment while data were analyzed using simple statistical tools. Quadrate method of studied was also taken to know about the density, frequency, and abundance of the cane rich pockets of study areas. The areas are so favorable for the growth of cane, soil is rich in organic compound, lot of moisture, and the climate is humid and the identification of cane can be done by the arrangement of leaf, thorns along with the help of books, research paper and literatures etc. The ecological study of indigenous cane varieties were also conducted to know about the locality of the area, climate, soil, life form, forest type, and species identification, quadrate study were conducted and marked for grading. Cane varieties must be identified first; then studies related to ecology were completed with the help of soil and climatic analysis and other biological component found at study area. Study revealed that the two cane (Rattan) varieties were observed natural in cluster form *i e*;

Calamus tenuis near Kutumsar cave, in Kanger Valley National Park, *Calamus tenuis* near local river of Jaitgiri forest, whereas *Calamus rotang* near Ganesh Nala, local river of Machkot Forest range of Bastar region.

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1. Introduction

The word Rattan is derived from the Malay "rotan", the common name for climbing palms roughly 600 [species](#) of [palms](#) in the tribe *Calameae* (Greek 'Kálamos' = Reed), native to tropical regions and subtropics regions and exploited particularly for their flexible stems. Rattan is collected mainly from wild populations, although considerable efforts have recently been focused on the provision of raw cane from cultivated sources. The name 'Cane' (Rattan) stands collectively for the climbing members of a big group of Palms known as *Lepidocaryoideae*, fruit bearing scales. Rattans/Canes are prickly climbing Palms with solid stems, belonging to the family *Arecaceae* and the sub-family *Calamoideae*. They are scaly-fruited palms and the Rattans/Canes comprise more than 50 per cent of the total Palm taxa found in India (Lalnuntluanga *et al.*, 2010). Rattans, one of the important forest products after timber, form an integral part of rural and tribal population of many tropical countries. They are not only the chief raw material for industries in various parts of the world, but they also hold great social significance as a source of livelihood for the people residing near the forest areas. Although economically important, Rattans remained as a neglected natural resource till recent times.

India, with an area of 3.287 million square kilometers is marked with remarkable ecological, biological and cultural diversity. As per the State Forest Report 2013, India has 78.92 million ha areas of natural forests. Endowed with magnificent forests ranging from evergreen to moist deciduous, which cover 17.4% of the land area, India's economy is strongly linked with its forests. Rattans are predominantly plants of primary rain and monsoon forest (Dransfield & Manokaran, 1993). Some species may be adapted to growing in secondary habitats, but these are the exception. In India 70 species of Rattans are reported (Negi, 1995). The following three major centres of Rattan distribution in India, Western Ghats has only one genus *Calamus* with 21 species. Andaman & Nicobar Islands is represented by 3 genera with 18 species. The genera here are *Calamus* (11 species), *Daemonorops* (5 species) and *Korthalsia* (2 species). Northeast region of India comprises 24 species under 3 genera (excluding *Zalacca*) viz., *Calamus* (15 species with two varieties), *Daemonorops* (1 species) and *Plectocomia* (4 species) etc. Rattans are recognized as one of the most useful forest products in India and the resource plays an important role in the rural economy, employing many people in the remote areas who earn their living through extraction and cleaning of rattans.

Chhattisgarh state comprises three Agro climatic zones *i.e.*, Chhattisgarh plain in middle, Northern hills in the North and Bastar plateau in the South portion of the state. The state having approximate 44% forest covers of the landmass. Bastar region has rich diversity in vegetation and phytogeographical locations. The Rattans are characterized by some pockets distribution across various forest sites in Bastar region. Sometimes, they even extend to areas outside forests such as river, tank beds and edges of paddy fields. In Bastar region basically forest covered by Tropical moist deciduous forest and the climate is so favourable that many species and varieties can easily survive here; the soil is rich in organic matter. Bastar region having two types of cane varieties are found till the date *i.e.*, *Calamus rotang* and *Calamus tenuis*.

Calamus tenuis grow in moist damp areas and paddy fields and found naturally in Bastar region, whereas *Calamus rotang* grow in marshy plain and in sacred grooves this species found near Ganesh Bahar, Machkot range naturally and also, it is planted in Machkot forest range during the year 2008. Bastar region naturally cane species found in four different locations *ie.*, Akash Nagar (Bailadilla) Iron mining site, Ganesh Bahar nala Machkot range, Jaithgiri forest around Markandi nala Bakawand range and near Kutumser cave at Kanger Valley National Park, Koleng Darbha forest range. The Rattans are used in making of a valuable and expensive material, much appreciated for the making of furniture, walking-sticks, umbrellas and wickerwork is done in Narayanpur (C.G.). *Calamus tenuis* is good or good grade for furniture. In Bastar Cane (Rattan) has ethical value the tribal worship Cane with the GOD SHIV. The tribal of Bastar or the people of Bastar are not much aware about the cane and their uses and its profit in economic value.

Hence, the present study focused on the study deals with the ecology of indigenous cane varieties, identification, life form, uses and its sustainable management in Bastar region of Chhattisgarh state.

2. Research Method

The present work was completed in Kanger Valley National Park, Jaithgiri forest Bakawand range and Ganesh Bahar in Machkot forest range Jagdalpur, Chhattisgarh during the year 2015. The study deals with the ecology of indigenous cane variety found in Bastar region identification, distribution, collection, life form, grading and its uses, and also studied about importance value of index. The details of study sites, climatic conditions, weather, geology, physiographic features, soil properties and experimental procedure followed and techniques adopted.

2.1 Study sites

The study was done from three different identified sites, first is in natural forest of Kanger Valley, National Park and second is in natural forest site of Jaithgiri, Bakawan forest range and third site is in natural forest of Ganesh Bahar nala, Machkot forest of Bastar forest division. Chhattisgarh state has been divided into three agro-climatic zones viz; Central Chhattisgarh Plains, Southern Bastar Plateau and Northern Hills of Sarguja. The study site falls under the Southern Bastar Plateau agro-climatic zone of State. The brief of study sites as follow-

2.1.1 Kanger Valley National Park: located near Kholaba river Bastar district of Chhattisgarh state in India. It is situated 25 km away from southeast of Jagdalpur, on Jagdalpur-Bhadrachalam, National Highway Number 221, is one of such floristically rich protected areas and the area is moist and soil is rich in organic compound. It lies between 18°45' to 18°56'30 N latitude and 81°51'30 to 82°10' E longitude and covers an area of 200 km². It is totally protected area there is no human activity allowed. The valley is in fact one of the last pockets of almost virgin forests still left in the peninsular region. To protect this unique ecosystem, it has been proposed as biosphere reserve under the Man & Biosphere (MAB) program of UNESCO. This natural forest is one of the favorable habitats for Chhattisgarh state bird Hill Maina, reason behind it, Kanger Valley National Park declared as natural habitat of state birds. The reptiles includes, Lizards and the insects include Butterflies, Moths, Dragonflies, Grasshoppers etc. other important things it provide Butterflies habitat. Due to the favorable habitat condition inside the park government established Butterfly Zone in which diversity of Butterfly was found more. Above these two points gives special attraction of Park.

2.1.2 Jaithgiri Bakawand Forest Range: This is second study site, in this forest cane (Rattan) is found naturally and located near Markandi nala Jaithgiri forest the cane, variety identified in this site is

Calamus tenuis. The dominant tree species of this area is *Shorea robusta*. The host tree of cane is *Terminalia arjuna*. It lies between 75° 30' to 75° 33' E longitude and 12° 30' to 12° 32' N latitude with the elevation ranging between 140 and 500 m.

2.1.3 Machkot Forest Range: This is located near Ganesh Bahar nala of Machkot, forest range. It is a permanent & well maintained forest site. It was modified as a scientific plantation of cane on year 2008 under forest projects. It lies between 19°20'25.7"N latitude and 82°10'29.5"E longitude and angle of elevation is 614.0 m. It has number of medicinal & aromatic plants, ornamental and aesthetic herbs, shrubs & valuable timber and fruit and fodder trees. For proper growth of Cane the site selection, water facility, soil organic compound, and for control of insect-pests attacks, insecticides-pesticides are given time to time here.

The climate of Bastar region is hot & humid and the climate of whole year can be divided into four seasons *i.e.* summer, rainy, spring and winter seasons. The mean annual maximum temperature is 30.5°C the temperature in the month of January is 43.03°C and in the month of May is 243.90°C the mean maximum temperature gradually increases, after December, which is maximum in the up to. The summer season extend from the March to Mid June in this period the mean daily temperature ranges from a minimum 52.38°C temperature have been recorded.

2.2 Method of Sample Collection

The ecological study of indigenous cane variety was done with the help of phytosociology study of quadrat method. The minimum size of the quadrat is that size of the quadrat in which maximum number of species counted. For this a curve is drawn between the species and area of the quadrat and the point where the curve become constant and straight that is not any increase in the number of species the point is called minimum size quadrat. By this method the density, abundance, frequency of species can be calculated and by the addition of this three importance value of index can be calculated.

2.3 Formulas for the Phyto-sociological Studies

$$\text{Density} = \frac{\text{Total number of plants in the quadrates}}{\text{Number of quadrates examined}}$$

$$\text{Frequency} = \frac{\text{Number of quadrates in which the species occur}}{\text{Total number of quadrates examined}} \times 100$$

$$\text{Abundance} = \frac{\text{Total number of plants of a species in all the quadrates}}{\text{Number of quadrates in which the species occurred}}$$

$$\text{Relative Density} = \frac{\text{Total number of plants of a species}}{\text{Total number of plants of all the species}} \times 100$$

$$\text{Relative Frequency} = \frac{\text{Frequency of one species}}{\text{Frequency of all species}} \times 100$$

$$\text{Relative Abundance} = \frac{\text{Abundance of one species}}{\text{Abundance of all species}} \times 100$$

$$\text{Important Value Index (IVI)} = \text{Relative Density} + \text{Relative Abundance} + \text{Relative frequency}$$

2.4 Method of soil sampling and analysis

Soil sampling was done from the upper 10 cm soil layer for physico-chemical analysis. 5 sample sites are located randomly in each study site (Kutumsar, Jaithgiri and Machkot). Each sample was thoroughly mixed, air dried and sieved through a 2mm mesh screen for different chemical analysis. Soil sample for determining bulk density collected with the help of metal tube (5.0 cm) diameter. Soil pH was measured with glass electrode (1:2 Soil: Water), particle size distribution (texture analysis) by pipette titration method (Piper 1950). Organic carbon of

the soil was determined by Walkley and Black's method and available phosphorus was determined following by Olsen's method (Olsen *et al.*, 1954). Inorganic potassium determined by using flame photometer. Available N were measured by Kelplus (Pelican equipment) based on micro Kjeldhal principle. After through mixing of sample from a particular distance large pieces of plant materials were handpicked. The soils were sieved through 2 mm mesh screen, fine root were removed and the samples transported to the laboratory.

3. Results and Analysis

The present research studied were conducted on Cane (Rattan) rich pockets in Bastar forest division of Chhattisgarh state in year 2015 at Kutumsar cave, Kanger Valley National Park, Markhandi nala Jaithgiri forest range, Bakawand and Ganesh Bahar, Machkot forest range of Bastar forest division. The results based on the observations of ecology, distribution & diversity and physic-chemical properties of soil along with sustainable management of cane varieties found in natural forest of Bastar region. Results are presented in appropriate table after analysis. It is contemplated to discuss the variations, observed in availability of cane varieties in natural forest and livelihood support for rural population. The associated reasons and possible explanations with observations recorded in the present study are discussed along with certain relevant and supporting studies which have been conducted by various workers in different areas.

3.1 Cane (Rattan) rich pockets in Bastar forest division in Chhattisgarh State

3.1.1 Jaithgiri forest site: The first Cane rich pocket observed during study is Jaithgiri forest lies between 75° 30' to 75° 33' E longitude and 12° 30' to 12° 32' N latitude with the elevation ranging between 140 and 500 m above MSL. It receives an annual rainfall of about 4268 mm. The vegetation is of deciduous type. The dominant tree species is *Shorea robusta*. The other common plant species met with are *Diospyros melonozylon*, *Buchnani lanzan* *Terminelia arjuna*, *Terminelia belleric*, *Terminelia tomentosa* *Pongamia pinnata* *Schleirea oleosa*, *cassia fistula* and *Sterculia urens*. One species of Rattan have been recorded in this area viz. *Calamus tenuis*. Since the distribution of *C. tenuis* is restricted to Bastar region of the

Chhattisgarh, its population is high in Jaithgiri forest, and location is recommended for *in situ* conservation. *Calamus tenuis* is well distributed in about 5 km radius around Markhandi nala and also found in strips on river as compared to Rattan distribution in other locations as Kutumsar and Machkot forest sites. The perennial streams as well as deciduous and semi evergreen vegetation seem to favour the higher population of this species here. Since *C. tenuis* cane is extensively extracted by the local people and tribes of this area for the manufacture of baskets and other handicrafts and other agricultural tools and also home necessity.

3.1.2 Kutumsar forest site: The another site of Cane rich pocket is identified at Kanger Valley National Park near Kutumsar cave lies between 75° 25' to 75° 27' E longitude and 12° 27' to 12° 30' N latitude with the elevation ranging between 180 and 400 m above MSL. It receives an annual rainfall of about 5568 mm. The vegetation is of moist deciduous type and the dominant species is *Shorea robusta*, the other common species are *Tectona grandis*, *Adina cardifolia*, *buchnaia lanzan* *anacadium accidental*, *Terminelia tomentosa*, *boswelia sarata*, *Bauhinia variegata*, *zizyphus moritiana*, *Butea monosperma psidium cumini* and *aegle mormelos*. One species of rattans have been recorded in this area viz. *Calamus rotang* is the most common species in India. This location is recommended for *in situ* conservation of *Calamus rotang*, whose distribution is restricted to the Bastar region of state, as there is a significant level of population of this species in this locality.

3.1.3 Machkot Forest Site: The third cane rich pocket is found in Machkot forest near Ganesh bahar Nala lies between 75° 25' to 75° 27' E longitude and 12° 27' to 12° 30' N latitude with the elevation ranging between 180 and 400 m above MSL. It receives an annual rainfall of about 5568 mm. The vegetation is of dry deciduous type and the dominant species is *Shorea robusta*, the other common species are *Madhuca indica*, *Diospyrus melonozylon*, *Terminelia tomentosa*, *Semcarpus anacardium*, *Antidesma diandrum*, *Zizyphus jujube*, *Dalberdia sissoo*, *Bauhinia purpurea* and *ficus bengelensi* etc. Here species of rattans have been recorded in this area as again *Calamus rotang*, the most common species in India. This location is recommended for *in situ* conservation of *Calamus rotang*, whose distribution is restricted to the Bastar region of state, as there is a significant level of population of this species in this locality. More than 50% of rattans flourishing in the region have restricted distribution and endemic to the region. Due to over exploitation, reduction and destruction of natural habitat, existence of many of them is threatened (Basu, 1985).

3.2 Reported species of Cane (Rattan) in Bastar forest division

3.2.1 *Calamus tenuis* Roxb. (The specific name is due to the slender stem *Tenuis* = thin, slender) commonly known as Rattan or Cane and locally called Benth, Jati beth, and Pani beth etc. during the study *Calamus tenuis* species was identified in two studied sites of study areas (*viz.*, Kutumsar cave Kanger Valley national Park and Markandi nala Jaithgiri of Bakavand forest range) in Bastar forest division. This species found naturally in core area of Kanger Valley National Park in patch near Kutumsar cave. The diameter of species was recorded nearly 1.5 cm; the height of the cane is approx 20-25 m. The forest types of study area are tropical moist deciduous forest, but the species remain evergreen and life form of the species is in clump form. The area is humid and moist which is favourable for the growth and development of Cane. The host trees of cane near Kutumsar cave were observed *Terminelia arjuna*, *Diospyros melonoxylon*, and *Diospyros malabarica*. Whereas in Jaithgiri forest range the host tree of Rattan was observed *Terminelia arjuna* tree. Silvicultural characters of the Rattan fruits germinate within a month. Even though seedlings need partial shade for the initial growth, mature plant thrives well in the open condition. During the study also reported the local use of Rattan by local people used in furniture making and some other agriculture based items and the shoot tip (Palm heart) is used as edible. Flowering in Rattan comes from month of September to October and fruiting will be started at April up to month of May. Stem is 2.5 cm in diameter with sheaths, and 1.5 cm without sheaths. Leaf is about 1m long with regular leaflets; leaf sheath is green with oblique white patches, sparingly armed with black spines which are solitary or grouped; knee is prominent. Inflorescence is flagellate. Fruit is broadly ovoid, 1.4 x 1 cm; scales grey white on ripening and with a dark brown border towards the apex, channeled in the middle.

3.2.2 *Calamus rotang* Linn. (*Calamus rotang*) Hindi Benth, locally known as Ram Beth. This is not a montane species and seen only on marshy areas. In Bastar region this species was observed in Machkot forest range near Ganesh Bahar nala on strips and patches with approximate area is covered up to 20 ha. *Calamus rotang* is a cane of marshy land and found in sacred grooves. Medicinally it is used for curing chronic fever, skin diseases, burning sensation, cough, bronchitis, inflammation, calculi and general debility. Useful parts of the plant are fruits, seeds, petals, fruit extracts, and stem etc. Its slender and cylindrical stem is the source of the well known Rattan, a valuable and expensive material, much appreciated for the making of furniture, walking-sticks, umbrellas and wickerwork. However, similar products are often made out of stems of many other plants, mostly Gramineae (particularly Bamboos), Juncaceae (rushes) or, finally, out of tender and slender branches of willows (wicker). It is growing naturally in the forests of Western Ghats, also in the forests of central and south India. In Kerala this is localized near the backwaters of Quilon, Deccan Peninsula and Ceylon. Flowering comes in month of October to December; and fruiting will start in month of March up to May. Botanically this species is a

large spreading slender shrub with round yellowish stems. Leaves sheath glabrous below hollowed, truncate, with short ochrea, rachis near the base flat and smooth, leaflets numerous, 1 ribbed; flowers unisexual, spadix very long, female flowers scatted along the branched of spadix; fruits in minute perianth, sub globose, pale yellow.

3.3 Phytosociological distribution of Rattan in Bastar forest division

The study were conducted for phytosociological studies Rattan in Bastar forest division in three different sites dominated by indigenous Cane or Rattan species found in the natural forest of Bastar division is given in table No. 1. The Phyto-sociological studies of cane in Jaithgiri Bakawand forest range was found that the total number of clump from four quadrates were 76 which was observed highest followed by 74 in Kutumsar site whereas lowest number of clump were reported 38 in Ganesh Bahar nala of Machkot range. The frequency of three sites were approximate same. The highest density was recorded 9.5 in Jaithgiri followed by 6.06 for Kutumsar and the lowest density was 4.2 found in Ganesh Bahar nala site. The relative density, relative frequency and relative abundance were also found highest in Jaithgiri followed by Kutumsar and lowest was recorded in Ganesh Bahar nala of Machkot forest range. The Importance Value Index (IVI) of three sites were calculated, the highest recorded IVI was 77 in Jaithgiri whereas total IVI were estimated 213.

Rattans belong to a group of spiny palms of the sub-family Calamoideae under Arecaceae, characterized by fruit bearing scales. The word rattan is derived from the Malay Rattan, the local name for climbing palms (Sunderland & Dransfield, 2002). It is a large and diverse group of climbing and non-climbing palms, comprising an important group of NWFPs that are extensively collected for household uses and cash income in the humid tropics (Singh *et;al*, 2004). Research in Asia has shown that rattan diversity, abundance and distribution, are often related to edaphic and climatic factors (Siebert, 1993). It is also speculated that the rattan diversity of a sample area is closely related to overall species diversity (Dransfield, 1992).

In addition to assessments of diversity, the stocking, growth rates and potential harvest yield of rattans is crucial in determining levels of sustainable harvesting. For this baseline information to be available, rapid methods of assessment and inventory that are both accurate as well as economically and logistically feasible, need to be developed and implemented. In conjunction with these one-off surveys, the establishment of permanent sample plots to

monitor mortality, growth and recruitment against this baseline, allows additional, and more detailed, information to be gathered. Combined, these techniques provide information that is crucial for the determination of sustainable levels of exploitation for commercially important rattan species. Rattans grow under a variety of ecological conditions. They have a tendency to occupy different altitudinal and rainfall zones. They are distributed from sea level to about 2000 m above MSL, and show altitudinal preferences. Lakshmana, (1993) similarly, one can classify them under 1500, 1500 to 3000 and 3000 mm and above rainfall zones. In Peninsular India, some species are found in wet evergreen forests with an annual rainfall of 5000 mm, while there are some others which are found in areas with an annual rainfall of 750 mm only. Some species are found growing along streams, in marshy areas and coastal regions, while few others grow along the fringes of shoal forests at higher altitudes. Based on the studies of Rattans in the natural forest of Bastar forest division of Chhattisgarh state has three rich pockets viz; Jaithgiri forest site, Machkot forest site and Kutumsar forest were recommended for *in situ* conservation of Rattan species endemic to Bastar.

Table 1: Phyto-sociological Studies of Cane (Rattan) in Bastar Forest Division at Chhattisgarh State

SN	Rattan Rich Pockets	No. of clump, solitary	Frequency	Density	Abundance	RF	RD	RA	IVI
1	Kutumsar Cave	74	100	6.06	24.25	25	25	25	75
2	Ganesh Bahar Nala	38	100	4.25	11.00	25	11.00	25	61
3	Jaithgiri forest	76	100	9.5	77.5	25	27	25	77

- **RF - indicate Relative frequency, RD- indicate relative density and RA- indicate relative abundance etc.**

4. Conclusion

The potential of Rattan is very high but it remains largely unrealized in India. The root cause of the problem is the increasing scarcity of the raw material, which is aggravated by the gross inefficiency in management, harvesting, storage and processing. There is no accurate assessment of the demand and supply position of the resources, which results in considerable uncertainties in the industrial and business operations. Over-exploitation of the existing forests is threatening the very existence of important genetic resources of these species.

Contribution made by researchers in the field of canes distribution, and utilization and propagation are scanty and proportionately very less in Bastar region. Thus, need is felt to study in-depth on cane species, which is recognized as one of the important non wood forest products, having potential to improve socio-economic condition of forest dwellers and people of adjoining area. Improved silvicultural practices and methods for harvesting, storage and processing need to be devised and marketing forces to be activated and organized.

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