

## **Composition of tree species and regeneration potential at Onigambari forest reserve, Ibadan, Oyo State, Nigeria**

**\*Oduwaiye, E. A. and Ajibode, M. O.**

Forestry and Wildlife Resources Management, Federal University of Agriculture,  
P.M.B 2240, Abeokuta, Ogun State, Nigeria

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### **Abstract**

*The tree composition and regeneration potential of Onigambari Forestry Reserve was evaluated. Wildlings along Point Centre Quadrat (PCQ) of each of the five perpendicular transects, were identified for the determination of relative frequency and regeneration potential. The relative density, frequency and dominance of woody species were also assessed. Out of fifty-five species encountered in the five transects sampled, eleven (11) species had the highest regeneration potential which ranged between 0.010 and 0.089; and relative frequency between 2.46% and 23.15%. *Anglocalyx oligophyllus* was abundant with relative frequency of 8.37%. The number of woody species between 11 and 30cm diameter at breast height (dbh) was the highest. *Triplochiton scleroxylon* and *Albizia ferruginea* two important species with the highest dbh of 2.0m and 2.8m respectively. Necessity to intensify the regeneration methodology of forest reserve is advised, based on the composition and regeneration potential of tree species in the present study.*

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### **Introduction**

The forest reserves in Nigeria and protected forests outside the reserve provide a lot of tangible and intangible benefits of forest products. Sustenance of these resources depends on conservation or other management techniques employed. Over 350,000 ha of forest and natural vegetation are being lost annually in Nigeria due to desertification, soil erosion, declining soil fertility, flooding and extinction of important plant species [1].

The forests of Nigeria comprise swamp forests, tropical rainforest and secondary forest regrowths. The lowland tropical rain-

forest was described by Keay [2] as a complicated mosaic of communities of different status and floristic composition. Structurally, the forests consist of three layers, the tree layer, the shrub layer and the undergrowth. Many of the emergent species in the forest grow rather slowly and required fair amount of overhead shade in their early life in order to survive and thrive. But, it is now recognized that many of them grow very rapidly in full light conditions [3]. They exist for long periods in a state of suppressed growth under the shade of the canopy until a gap occurs which allows them to grow up. Forestry growth cycle according to [4] consists of a mosaic gap-phase, building phase and mature phase forests.

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\* Corresponding author

Forest reserved areas can be sustained through an effective regeneration programme. From regeneration analysis in Okomu Forest Reserve, it was observed that most of the woody species were not regenerating themselves [5]. There were instances when mother trees of the various wildlings were absent from plots of Okomu Forest Reserve. The situation actually posed a great threat to conservation of the diversified species in the PSP85, Okomu Forest Reserve [5]. The present study on the tree composition and regeneration potential shows the position of the forest reserve as well as the possibility of the forest renewal.

## Materials and Methods

### (a) Study area:-

Onigambari Forest Reserve is located between latitude  $7^{\circ}26'N$  and longitude  $3^{\circ}54'E$ . Composition of tree species and their regeneration potential were assessed in a plot, which lies between the location, which is about 17km south-east of Ibadan, Idi-Ayunre-Ijebu-Ode Road, Oyo State. The location is about 2km away from the nearest road, well obscured by some forest fallows in the neighbourhood of Onigambari area.

### (b) Method of data collection:

A reconnaissance survey of the reserve was carried out to establish the baseline for the transects. Subsequently, five transects were cut perpendicular to the baseline. The transects were pegged at 10m intervals. Along each transect, important data were collected, using Point Centre Quadrat (PCQ) of plotless sampling method of Cuttall and Curtis [6] at 10m apart. Within each sampling quadrat, plant species were identified and listed. Those that could not be immediately identified were collected and taken to Forestry Research Institute of Nigeria (FRIN) Herbarium for identification. Wildlings within 1m from the centre of quadrat laid to the nearest woody tree species were identified and

listed for the calculation of relative frequency and regeneration potential. Parameter taken on the woody species was diameter at breast height (dbh:) distance between PCQ and woody species, canopy closure and height. The relative density, frequency and dominance of woody species in Onigambari Forest Reserve were also calculated.

### (c) Method of data analysis

- i) Stem density = The distance measured between sample point (PCQ) and each woody stem was used to obtain the density of woody stem. It is expressed as:

$$\text{Density (D)} = \frac{100^2}{d^2} \text{ stem/ha}$$

d = mean distance measured from PCQ

- ii) **Size – class distribution (Bar chart)**

The diameter at breast height (dbh) of the woody plant in each quarter from PCQ was measured to obtain the size class as shown below:

- Size – class 1 = Plant between 0 – 10cm in dbh
- Size – class 2 = Plant between 11 – 30cm in dbh
- Size – class 3 = Plant between 31 – 60cm in dbh
- Size – class 4 = Plant between 61 – 90cm in dbh
- Size – class 5 = Plant greater than 90cm in dbh

- iii. Wildlings: along each PCQ, wildlings of individual species were assessed to get the following.

- Regeneration Potential = 
$$\frac{\text{No of Individual species of wildlings}}{\text{Density of woody stem}}$$

- Relative Frequency of sp = 
$$\frac{\text{Frequency of Ind. sp}}{\text{Total Density of all species}} \times 100$$

- Relative Dominance = 
$$\frac{\text{Sum of basal area Ind. sp}}{\text{Sum of basal area of all Sp.}} \times 100$$

Important value of sp =  
Sum of relative density, frequency and dominance  
Basal area =  $\frac{g^2}{4\pi}$

where g = girth at breath height  
 $\pi = 3.142$   
4 = is a constant value

## Results and Discussion

Details of composition of plant species, families and habits at Onigambari Forest Reserve are given in Table 1. In terms of specie richness, transects one, three and five ( $T_1$ ,  $T_3$  &  $T_5$ ) had 36 species each. Transect two ( $T_2$ ) had 35 species and transect four ( $T_4$ ) had the lowest number of 31 species. Identified species in various Transects were classified into different life forms such as trees, shrubs, palm and climbers (Table 1).

**Table 1: Checklist of tree species and families at Onigambari Forest Reserve**

| S/N   | Family           | No of species | Name of Species                                                                                                                                                                                                      | Habits                                  |
|-------|------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| i.    | Acanthaceae      | 1             | <i>Justica flava</i>                                                                                                                                                                                                 | Herb                                    |
| ii.   | Anacardiaceae    | 2             | <i>Nothospondia staudtii</i><br><i>Sorindia sp.</i>                                                                                                                                                                  | Tree                                    |
| iii.  | Annonaceae       | 1             | <i>Mondora tenuifolia</i>                                                                                                                                                                                            | Tree                                    |
| iv.   | Apocynaceae      | 7             | <i>Alstonia booneii</i> , <i>Alafia barterii</i><br><i>Baissea axillaris</i><br><i>Funtumia elastica</i> , <i>Hendranthera</i><br><i>Barterii</i> , <i>Montandra guinensis</i><br><i>Tabernaemontana-pachysiphon</i> | Tree<br>Tree<br>Climber<br>Tree<br>Tree |
| v.    | Araceae          | 1             | <i>Culcacia saxatillis</i>                                                                                                                                                                                           | Climber                                 |
| vi.   | Boraginaceae     | 1             | <i>Cordia millenii</i>                                                                                                                                                                                               | Tree                                    |
| vii.  | Caesalpinioideae | 1             | <i>Amphimas pterocarpoides</i>                                                                                                                                                                                       | Tree                                    |
| viii. | Capparaceae      | 1             | <i>Ritchea sp.</i>                                                                                                                                                                                                   |                                         |
| ix.   | Celastraceae     | 2             | <i>Salacia erecta</i><br><i>Salacia pallescens</i>                                                                                                                                                                   | Climber<br>Climber                      |
| x.    | Combretaceae     | 1             | <i>Combretum sp</i>                                                                                                                                                                                                  | Climber                                 |
| xi.   | Connaraceae      | 2             | <i>Agelaea sp (woody)</i><br><i>Gnetis ferruginea</i>                                                                                                                                                                | Climber<br>Shrub                        |
| xii.  | Ebenaceae        | 1             | <i>(Diospyros barterii)</i>                                                                                                                                                                                          | Tree                                    |
| xiii. | Euphorbiaceae    | 5             | <i>Drypetes gilgiana</i><br><i>Euphorbia sp</i><br><i>Mallotus oppositifolius</i> , <i>Magarieteria</i><br><i>discoides</i> , <i>Ricinodendron heudelotii</i>                                                        | Tree<br>Herb<br>Shrub<br>Tree<br>Tree   |
| xiv.  | Icacinaeae       | 1             | <i>Icacina trichantha</i>                                                                                                                                                                                            | Shrub                                   |
| xv.   | Lecythidaceae    | 1             | <i>Napoleona vogelii</i>                                                                                                                                                                                             | Tree                                    |
| xvi.  | Melastomataceae  | 1             | <i>Memecylon afzelia</i>                                                                                                                                                                                             | Tree                                    |
| xvii. | Meliaceae        | 4             | <i>Cedrela odorata</i><br><i>Guarea cedrata</i>                                                                                                                                                                      | Tree<br>Tree                            |

|        |                |   |                                    |               |
|--------|----------------|---|------------------------------------|---------------|
|        |                |   | <i>Khaya grandifoliola</i>         | Tree          |
|        |                |   | <i>Trichillia prieuriana</i>       | Shrub         |
| xviii  | Mensperamaceae | 1 | <i>Sphenocentrum jollyanum</i>     | Shrub         |
| xix    | Mimosoideae    | 2 | <i>Albizia ferruginea</i>          | Tree          |
|        |                |   | <i>Acacia ataxacantha</i>          | Climber       |
| xx     | Moraceae       | 3 | <i>Antiaris africana</i>           | Tree          |
|        |                |   | <i>Treculia africana</i>           | Tree          |
|        |                |   | <i>Trilepsium madagascariensis</i> | Fig like Tree |
| xxii   | Myristacaceae  | 1 | <i>Pycnanthus angolensis</i>       | Tree          |
| xxii   | Olaceae        | 2 | <i>Olex subscorpoides</i>          | Shrub         |
|        |                |   | <i>Strombosis pustulata</i>        | Tree          |
| xxiii  | Palmaceae      | 1 | <i>Elaeis guinensis</i>            | Palm          |
| xxiv   | Panaceae       | 1 | <i>Microdesmus puberula</i>        | Shrub         |
| Xxv    | Papilionoideae | 5 | <i>Angylocalyx oligophyllus</i>    | Shrub         |
|        |                |   | <i>Raphia nitida</i>               | Tree          |
|        |                |   | <i>Dalbergia saxatilis</i>         | Climber       |
|        |                |   | <i>Pterocarpus osun</i>            | Tree          |
|        |                |   | <i>Baphia pubescens</i>            | Tree          |
| xxvi   | Polygalaceae   | 1 | <i>Carpolobia lutea</i>            | Shrub         |
| xxvii  | Rubiaceae      | 4 | <i>Coffea afzelia</i>              | Shrub         |
|        |                |   | <i>Oxyanthus angolensis</i>        | Shrub         |
|        |                |   | <i>Psychotria sp</i>               | Shrub         |
|        |                |   | <i>Chassalia kolly</i>             | Shrub         |
| xxviii | Rutaceae       | 1 | <i>Fagara zanto</i>                |               |
| xxix   | Sapindaceae    | 3 | <i>Blighia unijugata</i>           | Tree          |
|        |                |   | <i>Deinbollia pinnata</i>          | Shrub         |
|        |                |   | <i>Lecanodiscus cupanoides</i>     | Tree          |
| xxx    | Sterculiaceae  | 4 | <i>Cola gigantea</i>               | Tree          |
|        |                |   | <i>Cola millenii</i>               | Tree          |
|        |                |   | <i>Triplochiton scleroxylon</i>    | Tree          |
|        |                |   | <i>Sterculia rhizopetala</i>       | Tree          |
| xxxi   | Ulmaceae       | 3 | <i>Celtis wightii</i>              | Tree          |
|        |                |   | <i>Celtis zenkeri</i>              | Tree          |
|        |                |   | <i>Holoptelia grandis</i>          | Tree          |
| xxxii  | Tiliaceae      | 1 | <i>Grewia sp</i>                   | Shrub         |
| xxxiii | Violaceae      | 2 | <i>Rinorea dentate</i>             | Tree          |
|        |                |   | <i>Lagateria spidetu</i>           |               |

The species were further classified into three groups according to their distribution as presented in Table 2. The species that are available in all transects are regarded as

commonly available, those that occurred in only two transects are regarded as available while those that occurred in only one transect are regarded as rare.

**Table 2: Classes of species according to their distribution**

| Commonly available in all transects | Available in 2 or 3 transects      | Rare species except in one transect |
|-------------------------------------|------------------------------------|-------------------------------------|
| <i>Anglocalyx oligophyllus</i>      | <i>Agalaea</i> sp                  | <i>Acacia ataxacantha</i>           |
| <i>Baphia nitida</i>                | <i>Alafia barterii</i>             | <i>Amphimas -</i>                   |
| <i>Funtumia elastica</i>            | <i>Alstonia booneii</i>            | <i>pterocarpoides</i>               |
| <i>Microdesmis elastica</i>         | <i>Antiaris africana</i>           | <i>Albizia ferruginea</i>           |
| <i>Sphenocentrum jollyanum</i>      | <i>Gnetis ferruginea</i>           | <i>Baissea axillaris</i>            |
| <i>Salacia pallascens</i>           | <i>Carpolobia lutea</i>            | <i>Blighia unijugata</i>            |
| <i>Strombosia postulata</i>         | <i>Celtis zenkeri</i>              | <i>Cedrela odorata</i>              |
| <i>Trichilla prieuriana</i>         | <i>Celtis wightii</i>              | <i>Cola gigantea</i>                |
| <i>Trilepsium</i>                   | <i>Coffea afzelia</i>              | <i>Cordia millenii</i>              |
| <i>madagascariensis</i>             | <i>Cola millenii</i>               | <i>Dalbergia saxatilis</i>          |
|                                     | <i>Chassalia kolly</i>             | <i>Diospyros barterii</i>           |
|                                     | <i>Olex subscorpoides</i>          | <i>Euphorbia</i> sp                 |
|                                     | <i>Pycnathus angolensis</i>        | <i>Elais guinensis</i>              |
|                                     | <i>Sterculia rhizopetala</i>       | <i>Fagara zanto</i>                 |
|                                     | <i>Tabernaemontana-pachysiphon</i> | <i>Grewia</i> sp.                   |
|                                     | <i>Triplochiton- scleroxylon</i>   | <i>Magarieteria-discoides</i>       |
|                                     | <i>Deinbollia pinnata</i>          | <i>Monodora tenuifolia</i>          |
|                                     | <i>Combretum</i> sp                | <i>Oxyanthus</i> sp                 |
|                                     | <i>Drypetes gilgiana</i>           | <i>Pterocarpus osun</i>             |
|                                     | <i>Hedranthera barterii</i>        | <i>Ritchiea</i> sp.                 |
|                                     | <i>Holoptelia grandis</i>          | <i>Sorindia</i> sp                  |
|                                     | <i>Icacinia trichanta</i>          | <i>Salacia erecta</i>               |
|                                     | <i>Justicia flava</i>              | <i>Rinorea dentata</i>              |
|                                     | <i>Khaya grandifoliola</i>         | <i>Treculia africana</i>            |
|                                     | <i>Memecylon afzelia</i>           | <i>Ricinodendrum- heudolittii</i>   |
|                                     | <i>Montandra guinensis</i>         |                                     |
|                                     | <i>Napoleona vogelii</i>           | <i>Guarea cedreta</i>               |
|                                     | <i>Nothospondias- standtii</i>     | <i>Mallotus oppositifolius</i>      |
|                                     | <i>Baphia pubescens</i>            | <i>Lagateria spidectta</i>          |
|                                     | <i>Lecanodiscus-cupaniodes</i>     |                                     |

In terms of canopy closure, transect two ( $T_2$ ) with an average of 51.9% open canopy, had the highest number of 88 wildlings, followed by Transect four ( $T_4$ ), Transect three ( $T_3$ ) and Transect one ( $T_1$ ) with 80 and 70 wildlings respectively. Transect five ( $T_5$ ) had the least number of 64 wildlings. There were thirty-three families encountered in the sample plot, each of which had species greater than one (Table 1).

The structure of the forests in terms of canopy closure had influence on the species

regeneration in Onigambari Forest Reserve plot assessed. Series of species are known to establish themselves either on light or shade, showing that they have different microsite for better establishment. It may, therefore be necessary to silviculturally manipulate the canopy for species tolerance. It may also be necessary to understand the phenology of the forest reserve, as well as study whether seeds or fruits produced are under adequate physiological conditions to germinate and grow into wildlings for regeneration purpose [5].

Out of 55 species encountered in the five transects sampled, eleven species had the highest regeneration potential which ranged between 0.010 – 0.089 and relative frequency between 2.46% and 23.15% (Table 3). *Anglocalyx oligophyllus* species came out as the most abundant with relative frequency of 8.37%. Other abundant species were *Sphenocentrum jollyanum*, *Psychotria* sp, *Strombosia pustulata* and *Baphia nitida* with 6.65, 6.40, 5.91 and 5.17 relative frequency respectively (Table 3). *Gnetis ferruginea*,

*Pterocarpus osun* and *Pycnanthus angolensis* had low relative frequency. Onigambari Forest Reserve plot was rich in species diversity and important species such as *Apocynaceae* family, which dominated the reserve with high regeneration potential status. The occurrence of some species with high regeneration potential is an indication of their future composition in the forest reserve area, while those with low regeneration potential could likely be rare in the reserve area in future.

**Table 3: Regeneration Potential and Relative Frequency of wildlings in the Onigambari Forest Ecosystem**

| S/N | Species                            | Wildling No | Relative Frequency | Regeneration Potential |
|-----|------------------------------------|-------------|--------------------|------------------------|
| 1   | <i>Culcacia saxatilis</i>          | 94          | 23.15              | 0.089                  |
| 2   | <i>Anglocalyx oligophyllus</i>     | 34          | 8.37               | 0.032                  |
| 3   | <i>Sphenocentrum jolly annum</i>   | 27          | 6.65               | 0.026                  |
| 4   | <i>Psychotria</i> sp               | 26          | 6.40               | 0.015                  |
| 5   | <i>Strombosia pustulata</i>        | 24          | 5.91               | 0.023                  |
| 6   | <i>Baphia nitida</i>               | 21          | 5.17               | 0.020                  |
| 7   | <i>Microdesmus puberula</i>        | 17          | 4.19               | 0.016                  |
| 8   | <i>Cola millenii</i>               | 12          | 2.96               | 0.011                  |
| 9   | <i>Carpolobia lutea</i>            | 11          | 2.17               | 0.010                  |
| 10  | <i>Funtumia elastica</i>           | 11          | 2.17               | 0.010                  |
| 11  | <i>Trichilia preuriana</i>         | 10          | 2.46               | 0.010                  |
| 12  | <i>Alafia barterii</i>             | 7           | 1.72               | 0.007                  |
| 13  | <i>Coffea afzelia</i>              | 7           | 1.72               | 0.007                  |
| 14  | <i>Trilepsium madagascariensis</i> | 7           | 1.72               | 0.007                  |
| 15  | <i>Tabernaemontana pachysiphon</i> | 6           | 1.48               | 0.006                  |
| 16  | <i>Memecylon afzelia</i>           | 5           | 1.23               | 0.005                  |
| 17  | <i>Antiaris africana</i>           | 5           | 1.23               | 0.005                  |
| 18  | <i>Combretum</i> sp                | 5           | 1.23               | 0.005                  |
| 19  | <i>Icacinia trichanta</i>          | 5           | 1.23               | 0.005                  |
| 20  | <i>Montandra guineensis</i>        | 5           | 1.23               | 0.005                  |
| 21  | <i>Agelae</i> sp                   | 4           | 0.99               | 0.004                  |
| 22  | <i>Baphia pubescens</i>            | 4           | 0.99               | 0.004                  |
| 23  | <i>Hedranthera barterii</i>        | 4           | 0.99               | 0.004                  |
| 24  | <i>Justica flava</i>               | 4           | 0.99               | 0.004                  |
| 25  | <i>Salacia pallescens</i>          | 4           | 0.99               | 0.004                  |
| 26  | <i>Alstonia booneii</i>            | 3           | 0.74               | 0.003                  |
| 27  | <i>Celtis zenkeri</i>              | 3           | 0.74               | 0.003                  |
| 28  | <i>Cola giganteae</i>              | 3           | 0.74               | 0.003                  |
| 29  | <i>Drypetes gilgiana</i>           | 3           | 0.74               | 0.003                  |
| 30  | <i>Mallotus oppositifolius</i>     | 3           | 0.74               | 0.003                  |
| 31  | <i>Chassalia kolly</i>             | 2           | 0.49               | 0.002                  |
| 32  | <i>Deinbollia pinnata</i>          | 2           | 0.49               | 0.002                  |

|       |                                 |     |      |       |
|-------|---------------------------------|-----|------|-------|
| 33    | <i>Diospyros barteri</i>        | 2   | 0.49 | 0.002 |
| 34    | <i>Napoleona vogellii</i>       | 2   | 0.49 | 0.002 |
| 35    | <i>Olax subscorpoides</i>       | 2   | 0.49 | 0.002 |
| 36    | <i>Salacia erecta</i>           | 2   | 0.49 | 0.002 |
| 37    | <i>Sterculia rhizopetala</i>    | 2   | 0.49 | 0.002 |
| 38    | <i>Acacia ataxacantha</i>       | 1   | 0.25 | 0.001 |
| 39    | <i>Baissea axillaries</i>       | 1   | 0.25 | 0.001 |
| 40    | <i>Blighia unijugata</i>        | 1   | 0.25 | 0.001 |
| 41    | <i>Cedrela odorata</i>          | 1   | 0.25 | 0.001 |
| 42    | <i>Celtis wightii</i>           | 1   | 0.25 | 0.001 |
| 43    | <i>Dalbergia saxatilis</i>      | 1   | 0.25 | 0.001 |
| 44    | <i>Euphorbia sp</i>             | 1   | 0.25 | 0.001 |
| 45    | <i>Elaeis guinensis</i>         | 1   | 0.25 | 0.001 |
| 46    | <i>Gnetis ferruginea</i>        | 1   | 0.25 | 0.001 |
| 47    | <i>Grewia sp</i>                | 1   | 0.25 | 0.001 |
| 48    | <i>Lecanodiscus cupanioides</i> | 1   | 0.25 | 0.001 |
| 49    | <i>Monodora tenuifolia</i>      | 1   | 0.25 | 0.001 |
| 50    | <i>Oxyanthus angolensis</i>     | 1   | 0.25 | 0.001 |
| 51    | <i>Pycnanthus angolensis</i>    | 1   | 0.25 | 0.001 |
| 52    | <i>Rinoera dentate</i>          | 1   | 0.25 | 0.001 |
| 53    | <i>Ritchea sp</i>               | 1   | 0.25 | 0.001 |
| 54    | <i>Sorinda sp</i>               | 1   | 0.25 | 0.001 |
| 55    | <i>Pterocarpus osun</i>         | 1   | 0.25 | 0.001 |
| Total |                                 | 406 |      |       |

Fifteen woody species had relative density between 1.14 and 16.00 while sixteen species had less than 1 relative density. Five species had relative frequency of 5.00 and above, others had less than 1. Relative dominance of

seventeen species was above one and others had less than one (Table 4). Seven species had the highest input, giving important values which ranged between 10.89 and 33.45, while the rest had less than 10 (Table 4).

Table 4: Relative Density, Frequency and Dominance of woody species at Onigambari Forest Reserve

| S/N          | Species                            | Frequency | Relative density | Relative frequency | Relative dominance | Important values |
|--------------|------------------------------------|-----------|------------------|--------------------|--------------------|------------------|
| 1            | <i>Funtumia elastica</i>           | 13        | 16.16            | 16.25              | 1.04               | 33.45            |
| 2            | <i>Trilepsium madagascariensis</i> | 10        | 12.36            | 12.50              | 1.41               | 26.27            |
| 3            | <i>Strombosia pustulata</i>        | 8         | 10.46            | 10.00              | 0.67               | 21.13            |
| 4            | <i>Cola millenii</i>               | 5         | 6.65             | 6.25               | 0.72               | 13.62            |
| 5            | <i>Triplochiton scleroxylon</i>    | 3         | 3.80             | 3.75               | 3.56               | 11.11            |
| 6            | <i>Sterculia rhizophetala</i>      | 4         | 1.28             | 5.00               | 1.28               | 11.03            |
| 7            | <i>Pycnanthus angolensis</i>       | 4         | 1.14             | 5.00               | 1.14               | 10.89            |
| 8            | <i>Tabernaemontana pachysiphon</i> | 3         | 3.80             | 3.75               | 0.76               | 8.31             |
| 9            | <i>Holoptela grandis</i>           | 2         | 2.85             | 2.50               | 2.33               | 7.68             |
| 10           | <i>Trichilia prieuriana</i>        | 2         | 1.82             | 2.50               | 1.82               | 7.17             |
| 11           | <i>Albizia ferruginea</i>          | 1         | 0.95             | 1.25               | 4.74               | 6.94             |
| 12           | <i>Khaya grandifolia</i>           | 2         | 2.85             | 2.50               | 0.93               | 6.28             |
| 13           | <i>Lecanodiscus cupanoides</i>     | 2         | 2.85             | 2.50               | 0.66               | 6.01             |
| 14           | <i>Pterocarpus osun</i>            | 2         | 2.85             | 2.50               | 0.55               | 5.90             |
| 15           | <i>Celtis zenkeri</i>              | 2         | 2.85             | 2.50               | 0.55               | 5.90             |
| 16           | <i>Drypetes gilgiana</i>           | 2         | 2.85             | 2.50               | 0.46               | 5.81             |
| 17           | <i>Amphimos pterocarpoides</i>     | 1         | 0.95             | 1.25               | 3.22               | 5.42             |
| 18           | <i>Cordia millenii</i>             | 1         | 0.95             | 1.25               | 2.37               | 4.57             |
| 19           | <i>Alstonia millenii</i>           | 1         | 0.95             | 1.25               | 1.69               | 3.89             |
| 20           | <i>Lagateria spidetu</i>           | 1         | 0.95             | 1.25               | 1.69               | 3.89             |
| 21           | <i>Guarea cedrela</i>              | 1         | 0.95             | 1.25               | 1.69               | 3.89             |
| 22           | <i>Margarieteria discoides</i>     | 1         | 0.95             | 1.25               | 1.52               | 3.72             |
| 23           | <i>Fagara zanto</i>                | 1         | 0.95             | 1.25               | 1.52               | 3.72             |
| 24           | <i>Ricinodendro leudelotii</i>     | 1         | 0.95             | 1.25               | 1.52               | 3.72             |
| 25           | <i>Cedrela odorata</i>             | 1         | 0.95             | 1.25               | 1.35               | 3.55             |
| 26           | <i>Microdesmis puberula</i>        | 1         | 0.95             | 1.25               | 0.85               | 3.05             |
| 27           | <i>Cola gigantean</i>              | 1         | 0.95             | 1.25               | 0.73               | 2.93             |
| 28           | <i>Antiaris africana</i>           | 1         | 0.95             | 1.25               | 0.51               | 2.71             |
| 29           | <i>Treculia africana</i>           | 1         | 0.95             | 1.25               | 0.51               | 2.71             |
| 30           | <i>Napoliensia staudtii</i>        | 1         | 0.95             | 1.25               | 0.17               | 2.37             |
| 31           | <i>Nothospondia- staudtii</i>      | 1         | 0.95             | 1.25               | 0.17               | 2.37             |
| <b>Total</b> |                                    | <b>80</b> |                  |                    |                    |                  |

Woody species with dbh between 11 and 30cm had the highest number of 32 trees and those between 0 and 10cm followed with 25 trees. Tree with size – class between 31 and 60cm were 18 in number and the highest dbh

61 and 90cm were 5 trees. No species was recorded for size-class 90cm and above (Fig 1). *Triplochiton scleroxylon* and *Albizia ferruginea* were two important species measured for highest girth of 2.0m and 2.8m respectively.

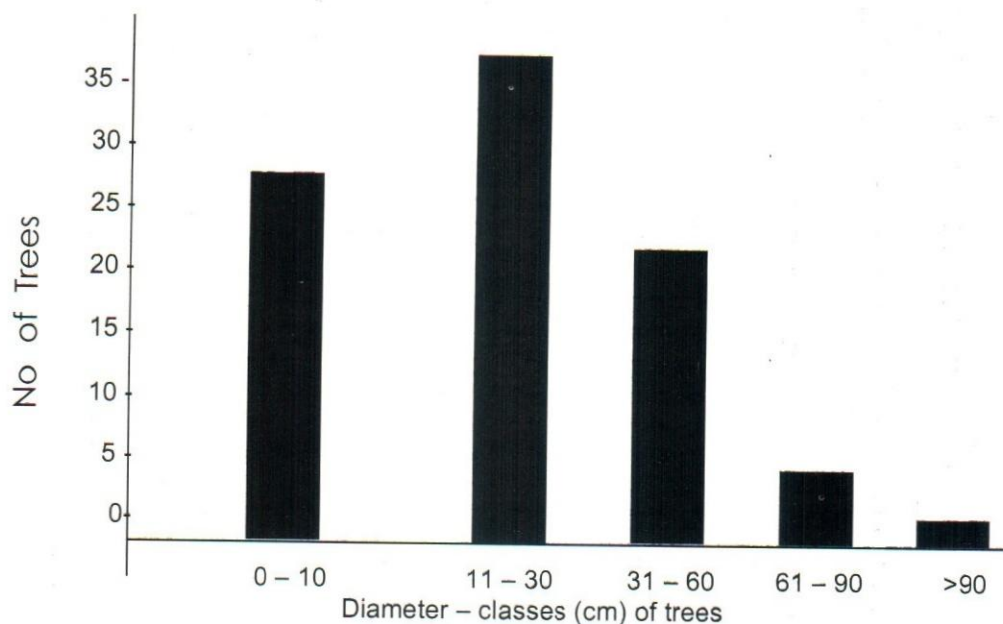


Fig. 1: Chart showing diameter at breast height class distribution.

Species which are classified by Redhead [7] as of economic importance exist in the reserve as follows:

- Class 1 - *Khaya grandifoliola* and *Triplochiton scleroxylon*
- Class 2 - *Albizia ferruginea*, *Pterocarpus osun*, *Pycnanthus angolense*,  
*Amphimas pterocarpoides*, *Celtis zenkeri*, and *Cola gigantes* and
- Class 3 - *Altonia booneii* *Diosporos* sp. *Fagari* sp and *Ricinodendrum heudelotii*

Others were tree species good for fuelwood, charcoal and industrial uses. These species in classes 1 – 3 were few and had no wildlings on the forest floors, hence, the necessity to intensify the methodology of regenerating the forest reserve.

Most of the plants are timber trees, some with edible fruits and leaves for medicinal preparations as shown in Table 5.

**Table 5: Important usefulness of some of the Forest Reserve Species.**

| S/N | Species                                        | Habit   | Uses                                                           |
|-----|------------------------------------------------|---------|----------------------------------------------------------------|
| 1   | <i>Culcacia saxatilis</i> A. Chev.             | Climber | Ripe fruits for soup preparation to stimulate appetite.        |
| 2   | <i>Cordia millenii</i> Bak.                    | Tree    | Wood for furniture material                                    |
| 3   | <i>Cnetis ferruginae</i> DC                    | Shrub   | Leaves for control of diarrhea                                 |
| 4   | <i>Icacinia trichanta</i> Oliv.                | Climber | Ripe fruits as source of vitamin C.                            |
| 5   | <i>Cedreta odorata</i> Linn                    | Tree    | Timber product                                                 |
| 6   | <i>Guare cedrata</i> . (A. Chev.) Peltegr      | Tree    | Timber product                                                 |
| 7   | <i>Khaya grandifoliola</i> DC                  | Tree    | Timber production and tree bark for malaria cum gum production |
| 8   | <i>Sphenocentrum jollyanum</i> Pierre          | Shrub   | Root cuts in gin for human power                               |
| 9   | <i>Albizia ferruginea</i> (Guill & Pern Benth) | Tree    | Timber product                                                 |
| 10  | <i>Antiaris africana</i> Engl.                 | Tree    | Timber product                                                 |
| 11  | <i>Treculia africana</i> Decne.                | Tree    | Edible fruit production                                        |
| 12  | <i>Alstonia booneii</i> Dewild.                | Tree    | Tree bark soak in water for malaria treatment.                 |

The result of this study provides relative quantitative data on flora richness of Onigambari Forest Reserve based on plotless sampling technique. Regene-ration status of the area is very important which shows the essence of the conservation. There are species that are non-timber products. If the

area is not properly conserved, the species are not always spared when clearing or exploitation of trees is allowed to be carried out in reserved area. Therefore, there is need to conserve the undergrowths, with their medicinal and economic importance among the key species.

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