Effects of Litter Decomposition of *Khaya grandfolia* and *Tectona grandis* on Biogeochemical Cycle in the Ecosystem

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**Abstract**

This study is on the effect of litter decomposition of *Khaya grandfolia* and *Tectona grandis* on nutrient status of the soil at the forestry arboretum of Rivers State University, Nkpolu, Port Harcourt. A composite soil sample of 0-15cm depth was collected at various distances 30cm, 60cm and 100cm away from the standing tree. The soil samples collected were air dried and passed through a 2mm sieve for laboratory analysis. The analysis shows that there was significant increase in total nitrogen, potassium and Phosphorus in *Khaya grandfolia* than *Tectona grandis* at 100cm away from the tree.

**Key Words:** Litter Decomposition, *Khaya grandfolia*, *tectona grandis* and Biogeochemical cycle

**Introduction**

The accumulation and decomposition of plant litter is an important factors in controlling vegetation structure and ecosystem function (Wardle et al, 1997). It is an important component of ecosystem functioning and nutrient cycling. (Jacob et al, 2014) Litter accumulation provides ground cover and reduces soil erosion and water running in the soil (Row, 2006) it creates soil micro-environments that support seed germination of selected plant species and provides soil nutrient and resource pools (Thomas et al, 2011) Nutrient concentration in plants controls the biogeochemical cycles, the amounts of nutrients taken up depends on the demand of plant species and also on availability of the nutrients in the soil (Abate, A. 2004). The leaf components of the plant is the most active and accumulate maximum amount of nutrients therefore, the input to the soil nutrient pool will be maximized by the litters in the vegetable. Leaf litter decomposition is important in agriculture because it adds organic matter to be soil thereby enriching the soil and enhancing (Hopkins, 2005) nutrient status such as nitrogen, potassium, phosphorus, total carbon. It is evident that without the decomposition of plant litter soil nutrient status will be affected leading to inability to support plant and agriculture in general.

Litter fall serves three functions in the ecosystem; energy input for soil micro flora and fauna, nutrient input for plant nutrient and material input for soil organic matter building up.

**Justification**

This research is aim at ascertaining the effect of litter decomposition of *Khaya grandfolia* and *Tectona grandis* on soil quality.

**Objectives**

1. Determine the effect of litter decomposition of Khaya grand folia and Tectona Grands on soil nutrient status.
2. To ascertain the difference in litter decomposition of Khaya grand folia and Tectona grands in soil quality.
**Materials and Methods**

Soil sample collection: Soil samples were collected at a depth of 0-15 cm using a soil auger borer at a distance of 30 cm, 60 cm, and 100 cm for *Khaya grandifolia* and *Tectona grandis*. The samples were bagged and transported to the laboratory for analysis. Total Nitrogen- Total nitrogen was determined using the micro Kyeldahl method, (1982) 1 gram of air-dried soil was weighed and mixed with a catalyst and sulphuric acid. It was digested and distilled and titrated with 0.0/N standard sulphuric acid and the result calculated. Available Phosphorus:- This was determined using Bray and Kurtz method. A 2.85g sample was taken and added to a 50ml flask with 4ml reagent solution and filled with distilled HzO and distillation factor taken.

**Statistical analysis**

The mean and standard deviation was used in statistical analysis. And it was observed that *Khaya grandifolia* had more nutrient status on the soil quality than *Tectona grandis* as shown on the tables below.

**Result and Discussion**

The result on the effect of litter fall decomposition of *Khaya grandifolia* on soil quality shows that at a distance of 100 cm away from the standing tree, the soil had more total nitrogen, available phosphorus and exchangeable potassium than at 60 cm and 30 cm away from the standing tree as shown in the table below.

<table>
<thead>
<tr>
<th>Samples</th>
<th>Total N</th>
<th>Available phosphorus</th>
<th>Exchangeable potassium</th>
</tr>
</thead>
<tbody>
<tr>
<td>100cm</td>
<td>0.144±0.02</td>
<td>17.65±0.03</td>
<td>120±1.25</td>
</tr>
<tr>
<td>60cm</td>
<td>0.060±0.01</td>
<td>14.65±0.55</td>
<td>101±2.01</td>
</tr>
<tr>
<td>30cm</td>
<td>0.08±0.03</td>
<td>15.54±0.04</td>
<td>112±1.01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Samples</th>
<th>Total N</th>
<th>Available phosphorus</th>
<th>Exchangeable potassium</th>
</tr>
</thead>
<tbody>
<tr>
<td>100cm</td>
<td>0.135±0.03</td>
<td>13.78±0.03</td>
<td>1.22±1.25</td>
</tr>
<tr>
<td>60cm</td>
<td>0.105±0.02</td>
<td>16.55±0.04</td>
<td>1.05±1.01</td>
</tr>
<tr>
<td>30cm</td>
<td>0.0658±0.01</td>
<td>12.00±0.05</td>
<td>108±2.01</td>
</tr>
</tbody>
</table>

**Conclusion**

Organic matter management is essential to sustainable fertility and productivity of the ecosystem since the litter decomposition of *Khaya grandifolia* is higher in soil nutrient status than *Tectona grandis*, it is necessary to plant more of the species as to aid in enhancing soil nutrient status, reducing erosion and aiding agricultural productivity in general.

**Reference**


Hopkins, B (2005): Litter production of decomposition dynamics in most deciduous forests of the Western Ghats in peninsular India, forest ecology.

Jacob, J. E (2010): Growth and water use of forest plantain proceeding of the international symposium held at the Hotel Ashok Radisson, India 4-7, 145-159.
