Nutritional values of indigenous fruit trees

The contribution of fruits to a healthy and nutritious diet is an established fact in the world. Indigenous fruits are sources of household diet especially during drought when there is food shortage. This is a common phenomenon in the rural areas in Nigeria. These fruits are essential to livelihoods of most rural communities, they are cultivated widely for its edible and nutritious fruits and seeds (Table 3a), and they are also rich in minerals (Table 3b). Notably, indigenous fruits contribute to food security of the rural population by providing a vast array of food which supplies essential nutrients especially when other food sources are unavailable. The fruits acts as an important source of vital nutrients especially to growing children who are prone to malnutrition. Not only does indigenous fruits provide food for household consumption, they also act as a source of income for the household. Trade in indigenous fruits contributes to livelihood through income generation and a safety-net for consumption and income-smoothing.

Introduction

Tropical rainforests are the most species-rich and diverse terrestrial ecosystems. Trees are an integral part of land resources and account for only 7% of the earth’s dry surface area. Trees provide some essential requirements of life such as food, fuelwood, medicine and shelter. Generally, trees form the basis on which the survival of all organisms depend, both directly and indirectly.

Indigenous Trees on Farm in Nigeria

Tackling the triple challenge of mitigation, adaptation and food security

Indigenous trees on farm

Indigenous trees are agroforestry tree products or non-timber forest products that contribute to food security, nutrition, medicine, income and environmental services. These trees are high in agro-biodiversity and are capable of tackling food insecurity and nutritional deficiencies, especially micronutrient (vitamins and minerals) deficiencies.

They are sometimes referred to as traditional foods and have strong socio-cultural links to their places of origin. They are usually rich in lipids, essential oils, vitamins and minerals and can be eaten raw, cooked, roasted or grilled. Indigenous trees are collected from the wild with limited attempts to cultivate or manage them systematically through improved seedling supply systems.

Conclusion

• Agroforestry management policies should incorporate forests and trees in the production plans
• Property rights and tenure should be protected by legislation
• Well-defined land, tree and carbon rights should be enforced to prevent dispute under defined rights which will provide poor people with legal access to land
• African governments should fund the development of indigenous species to the level of cultivars with known nutritional profile and agronomic requirement.

Recommendations

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Table 3a: Nutritional composition of some indigenous fruit trees.

<table>
<thead>
<tr>
<th>Fruit name</th>
<th>Dry matter (g/kg)</th>
<th>Moisture (%)</th>
<th>Crude protein (%)</th>
<th>Crude fiber (%)</th>
<th>Crude ash (%)</th>
<th>Carbohydrate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black pear</td>
<td>18.6</td>
<td>7.6</td>
<td>1.1</td>
<td>18.4</td>
<td>1.1</td>
<td>54.2</td>
</tr>
<tr>
<td>Africa star apple</td>
<td>15.8</td>
<td>10.4</td>
<td>1.3</td>
<td>24.3</td>
<td>1.3</td>
<td>57.1</td>
</tr>
<tr>
<td>Bush mango</td>
<td>17.2</td>
<td>9.0</td>
<td>1.5</td>
<td>23.1</td>
<td>1.5</td>
<td>55.3</td>
</tr>
</tbody>
</table>

Table 3b: Mineral composition of some indigenous fruit trees (mg/kg)

<table>
<thead>
<tr>
<th>Fruit name</th>
<th>Crude protein</th>
<th>Crude fiber</th>
<th>Crude ash</th>
<th>Iron</th>
<th>Manganese</th>
<th>Magnesium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black pear</td>
<td>6.5</td>
<td>4.0</td>
<td>1.5</td>
<td>5.0</td>
<td>50.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Africa star apple</td>
<td>7.2</td>
<td>4.5</td>
<td>1.8</td>
<td>5.5</td>
<td>52.0</td>
<td>20.5</td>
</tr>
<tr>
<td>Bush mango</td>
<td>7.5</td>
<td>5.0</td>
<td>1.5</td>
<td>5.5</td>
<td>55.0</td>
<td>20.5</td>
</tr>
</tbody>
</table>

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Despite the benefits of these indigenous trees, little has been done to improve or promote them. It is therefore important to conduct research on how to encourage communities to adopt tree-based systems. Some suggestions:

1. Increase tree cover outside forests e.g. promote home gardens.
2. Enhance forest carbon stocks. Home gardens serve as carbon sinks, trees can ensure fertile soil in the long run, reduce emissions, provide biomass energy and fuel wood which is relatively cheap.
3. Conserve biodiversity. These indigenous trees are multi-purpose; they can be cultivated alongside leguminous and shade trees or perennial species in agroforestry farming systems.
4. Reduce risk and intensity of damage. Trees on farms enhance food security, and result in environmentally-friendly agriculture by reducing soil temperature, maintaining soil moisture and producing fuelwood.
5. Maintain health and utility of landscapes. Trees on steep slopes increase climate resilience, reduce land erosion and floods and increase carbon sequestration.
6. Scale up multiple benefits. Trees provide alternative livelihood options, create employment, reduced poverty and rehabilitate degraded lands. Currently, most of the products are trees, and this is a threat to sustainable agriculture by reducing soil temperature, maintaining soil moisture and producing fuelwood.

## Approach

One of the projects implemented aimed to demonstrate successful integration of improved indigenous trees in rubber-based farming through modified planting systems in rehabilitated rubber farms. It was hoped that this would result in an increase in the economic and nutritional gains of farmers through diversification and intensification of their farmland. The concept adopted was the creation of an on-station nursery which served as a model, and then the creation of five pilot decentralized nurseries at the community level producing various improved indigenous species. Some of these species produced would either sold or integrated on farms.

### Table 1: Fruiting calendar of some indigenous fruit trees in Nigeria

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Local name</th>
<th>Early May</th>
<th>Mid May</th>
<th>Late May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

**Table 2: Priority medicinal/spices species in Edo State**

<table>
<thead>
<tr>
<th>Name</th>
<th>Common name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Tetraptera tetraptera</em></td>
<td>Aidian (Yoruba)</td>
<td>Tree planted on farm borders at 10x10m spacing in young plantation</td>
</tr>
<tr>
<td><em>Moringa oleifera</em></td>
<td>Moringa</td>
<td>Tree planted on farm borders and on avenue of young plantation (before canopy closure) at 5x5m spacing</td>
</tr>
<tr>
<td><em>Xylopia aethiopica</em> (Dunal) A. Richard</td>
<td>African/Ethiopian pepper</td>
<td>Tree planted on farm borders at 10x10m spacing</td>
</tr>
<tr>
<td><em>Dannetta tripetela</em> G Baker</td>
<td>Pepper fruit</td>
<td>Small tree planted on farm borders at 5x5m spacing in plantation</td>
</tr>
</tbody>
</table>

### Results

#### Germination rate of indigenous fruit trees through sexual propagation

Experiments were set up using five different germination substrates which were tested on each priority indigenous tree species to determine the most suitable substrate for their germination. Other measures such as scarification and soaking of seeds were also tested. Most of the seeds recorded high germination rates from top soil and river sand mixed together. Seeds with strong epicarp were scarified or soaked.

#### Production of indigenous trees

Farmers were encouraged to produce superior tree germplasm that can facilitate the uptake of, and return from such systems, bringing increased resources to farmers as well as providing other environmental benefits. Figure 3 below shows the annual progression of indigenous trees planted in community nurseries.

#### Germination rate on medicinal plants

The project demonstrated diversification of the income base through integration of non-rubber farming activities like medicinal plants that are shade-loving in mature rubber plantations. Some medicinal plants were successfully integrated in these mature rubber farms. The purpose is to diversify farmers’ income.

- Domestication of indigenous trees on farms through improved propagule types like marcotts, grafts and rooting of cuttings yields early-maturing fruits that are true-to-type and also brings more trees from the wild to the farm.