Tropical Root Crops

RESEARCH STRATEGIES FOR THE 1980s

Proceedings of the First Triennial Root Crops Symposium of the International Society for Tropical Root Crops - Africa Branch
TROPICAL ROOT CROPS: RESEARCH STRATEGIES FOR THE 1980s

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CASSAVA LEAF HARVESTING IN ZAIRE

N.B. LUTALADIO AND H.C. EZUMAH

PROGRAMME NATIONAL MANIOC (PRONAM), ZAIRE, AND INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE, IBADAN, NIGERIA

In Zaire, harvesting cassava leaves for use as a vegetable could increase the total revenue (leaf and root) from the crop by 1.5-6 times, depending on cultivar and on frequency of leaf harvesting. Frequent removal of leaves results in a high incidence of cassava mosaic disease (CMD) and reductions in root and leaf yields. Harvesting leaves once a month provides a high leaf production and returns with low losses in root yield.

La récolte de feuilles de manioc pour l'alimentation pourrait augmenter de 1,5 à 6 fois le revenu total de cette culture au Zaire, selon le cultivar et la fréquence de la cueillette. Cependant, les cueillettes trop rapprochées peuvent provoquer une attaque sévère de mosaïque et compromettre le rendement de la plante à la fois au niveau des tubercules et celui des feuilles. Une seule récolte de feuilles par mois assure la rentabilité de la culture en permettant une production élevée de feuilles et en réduisant les pertes de tubercules.

Cassava is the most important staple food in Zaire. Production is about 11 Mt, Zaire being the largest producer of cassava in Africa and third in the world after Brazil and Indonesia.

In Zaire, cassava provides about 60% of the average person’s daily caloric intake, and its leaves are the basic vegetable, the cheapest and richest source of protein. In addition to consumption by human beings, cassava leaves are used as a nutritionally valuable product in livestock feeds (Hutagalung et al. 1973; Moore 1976).

However, to date there have been few published reports on cassava leaf production. Montaldo and Montilla (1976) reported that harvesting of leaves in Venezuela decreased root production significantly when all mature blades were harvested every 4 months. In Zaire, PRONAM (Programme National Manioc) initiated studies to provide information on how the harvesting of leaves influences cassava foliage production, root yields, disease incidences, and total revenue.

Such information is critical to those who are involved in cassava production, especially in Zaire where leaves and roots are consumed almost daily.

PROCEDURE

Two cassava varieties, Kangu (a local variety grown in Bas-Zaire) and 02864 (a sweet variety developed by INERA), were planted on an alluvial soil deposit at M’vuazi, Zaire, during the growing season 1975-76.

Cassava stakes, 25 cm long, were planted on the flat on 35 m² at spacings of 1.00 × 1.00 m. The experimental design was a randomized block with four replications. The four treatments were harvesting:

- Frequently — whenever leaves were mature enough to be used as a vegetable;
- Once a month;
- Once every 2 months; and
- Not at all — the control.

From 5 months after the cassava was planted, leaves that were considered suitable for sale in the local market were harvested from the topmost part of the cassava canopy. We weighed them to estimate leaf production and the revenue of marketable leaves. Scoring for disease, such as cassava mosaic (CMD), cassava bacterial blight (CBB), and cassava anthracnose (CA) was done during the rainy and dry seasons. Fresh root yield was noted after 12 months.

RESULTS

Increased leaf yield was noticed during the rainy period, and leaf production tended to decline during the dry season as well as with increasing frequency of pruning, although variations in rates of decline were observed among the cultivars (Fig. 1).

Compared with monthly harvests, bimonthly harvests, i.e., every 2 months, reduced leaf production by more than 25% to 16.3 t/ha for Kangu.
and 17.6 t/ha for 02864, and harvesting frequently depressed leaf production even more (to 5.7 and 6.9 t/ha). The highest yields in leaves were obtained when leaves were harvested once a month — 22.7 t/ha for Kangu and 24.5 t/ha for 02864.

The more frequently that cassava leaves were harvested, the higher was the incidence of CMD (Table 1); the relationship of frequency of harvest and the prevalence of CBB and CA may not have been consistent throughout the crops' growth because rainfall and humidity are important in the expression of these two diseases (IITA 1975; Terry 1976). Nevertheless, it is noteworthy that there was a decline in anthracnose with increasing frequency of leaf harvest.

Harvesting leaves generally resulted in reduction of root yields compared with the control (14.5 t/ha for Kangu and 30.2 t/ha for 02864), but the extent of reduction varied with the frequency. Frequent harvesting caused significant reductions of 66 and

Fig. 1. Leaf yield of two cassava cultivars and rainfall distribution at M'vuazi, Zaire.
Table 1. Effect of frequency of leaf picking on the severity of diseases in two cassava cultivars.

<table>
<thead>
<tr>
<th>Leaf harvest</th>
<th>Kangu</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>02864</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CMD</td>
<td>CBB</td>
<td>CA</td>
<td>CMD</td>
<td>CBB</td>
<td>CA</td>
<td>CMD</td>
<td>CBB</td>
<td>CA</td>
<td>CMD</td>
</tr>
<tr>
<td>Frequently</td>
<td>5.0</td>
<td>4.8</td>
<td>1.8</td>
<td>4.3</td>
<td>4.0</td>
<td>2.1</td>
<td>4.8</td>
<td>2.5</td>
<td>2.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Monthly</td>
<td>4.5</td>
<td>2.8</td>
<td>2.2</td>
<td>4.0</td>
<td>3.0</td>
<td>2.2</td>
<td>4.8</td>
<td>2.3</td>
<td>2.2</td>
<td>3.0</td>
</tr>
<tr>
<td>Every 2 months</td>
<td>3.0</td>
<td>1.8</td>
<td>2.0</td>
<td>4.0</td>
<td>2.0</td>
<td>3.0</td>
<td>2.8</td>
<td>2.0</td>
<td>2.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Control</td>
<td>3.0</td>
<td>2.2</td>
<td>2.5</td>
<td>2.2</td>
<td>2.0</td>
<td>3.0</td>
<td>2.2</td>
<td>2.2</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Standard error</td>
<td>1.02</td>
<td>1.34</td>
<td>0.30</td>
<td>0.96</td>
<td>0.96</td>
<td>0.50</td>
<td>1.35</td>
<td>0.19</td>
<td>0.55</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Table 2. Effect of frequency of leaf picking on revenue (zaires/ha) from two cassava cultivars.

<table>
<thead>
<tr>
<th>Leaf harvest</th>
<th>Root revenue</th>
<th>Leaf revenue</th>
<th>Root revenue</th>
<th>Leaf revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequently</td>
<td>1.47a</td>
<td>5.70a</td>
<td>4.62a</td>
<td>6.90a</td>
</tr>
<tr>
<td>Monthly</td>
<td>3.30b</td>
<td>22.70c</td>
<td>7.56b</td>
<td>24.50c</td>
</tr>
<tr>
<td>Every 2 months</td>
<td>4.20c</td>
<td>16.30b</td>
<td>10.74c</td>
<td>17.60b</td>
</tr>
<tr>
<td>Control</td>
<td>4.35c</td>
<td>—</td>
<td>9.06a</td>
<td>—</td>
</tr>
</tbody>
</table>

*The revenues are based on 0.30 Z and 1.00 Z per kg of fresh roots and fresh leaves respectively; means followed by different letters are significant at the 5% level of probability.

49% to 4.9 and 15.4 t/ha for Kangu and 02864, respectively. Monthly harvests reduced root yields to 11.0 and 25.2 t/ha. Limited leaf harvesting was advantageous for 02864, where picking leaves once every 2 months increased root yields by 18.5% over the control.

The revenues of roots from the control were not significantly different from those obtained when leaves were harvested only once every 2 months, but lower revenues were obtained when leaves were harvested frequently or monthly. Revenue from leaves harvested monthly was higher than that obtained when leaves were harvested frequently or every 2 months. Total revenues (leaf and root) from harvesting leaves of 02864 cultivar frequently, once a month, and every 2 months were respectively, 1.6, 5.9, and 4.7 times those of the control, and for Kangu, they were 1.3, 3.5, and 3.1 times the control revenues.

**DISCUSSION AND CONCLUSIONS**

When leaves are harvested frequently, leaf production, root yield, and plant development and vigour are depressed. Frequent pruning also increases the prevalence of CMD and affects the overall yield and returns from the crop.

Harvesting leaves every 2 months does not affect root yield under the ecological conditions found in M'vuazi. In other words, a cassava field could be used as a source for leafy vegetables without adverse effects on root yields if leaves were harvested at appropriate intervals. Depending on the growth ability of the cultivar, leaf production could increase as a result of harvesting the leaves, the plant increasing its secondary, tertiary, and other branches. Our results suggest that cassava grown for roots can provide a high leaf revenue with little or no loss in root yields.

Where demands for cassava leaves as a vegetable are high, the revenue from the leaves will justify the efforts of breeders to screen for cassava cultivars with high leaf production and the need for fertilization with nitrogen and irrigation during the dry seasons to boost cassava leaf production.