Studies on Effectiveness of Curing practices carried out by Yam Farmers in Ohafia, Abia state, Nigeria: A step towards reducing Post Harvest losses of yam tubers during storage

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Introduction

• When tubers are wounded by surface abrasion or severe bruising these wound-healing processes do not occur. Weight loss and respiratory activity of bruised tubers remain high until decay. Abrasions or superficial cuts are not sealed off by a layer of periderm, and in consequence a prolonged loss of moisture content and an increased susceptibility to pathogen attack result (Passam et al., 2006).

• There are various processes for healing wounds. These differ in their technical methods, their demands on the climate and in the duration of treatment (FAO, 1990; Demeaux, 1984; Been et al, 1977).
• **Introduction cont...**

  Curing under a jute sheet or under jute sacks to maintain high humidity to promote wound-healing is a process developed by the FAO in Togo (FAO, 1990).

  – This process is very costly since approximately 50 US Dollars have to be estimated for the sacks (FAO, 1990). If the process were carried out with a sheet, the costs would be even higher.

  – The management of this process is also demanding since keeping the temperature (35 - 40°C) and the humidity (80 - 95%) is quite difficult.

  – Cost and management requirements give rise to the question as to whether this process can at all be adopted by the farmers.

• Yam farmers in Ohafia produce varieties that belong to *D. rotundata* (white yam), *D. alata* (water yam), *D. bulbifera* (aerial yam) and *D. cayensis* (yellow yam).

• Farmers in Ohafia and Eastern Nigeria cure yam tubers using different natural and readily available materials such as clay slurry, plant extract known as black seed (abachi) and sun curing.
Objective

- To study the effectiveness of different curing practices by yam farmers in Ohafia LGA in Abia State, Nigeria as it affects storage potentials of the yam cultivated in this area
Material and Methods

• **Location of barn:** *Okagwe* (on farm), *Ohafia* Local Government Area, Abia State, Nigeria.

• **Source of yam tubers:** 12 fresh yam tubers each from *D. rotundata, D. alata* and *D. bulbifera* were sourced from the farms of yam farmers residing within Okagwe.

• **Total number of tubers used:** thirty six (36)

• **Artificial wounds were introduced** so that the effectiveness of methods to promote wound healing could be tested.
Curing materials and preparations

Four (4) curing methods

1. Clay slurry curing
2. Black Seed (*Achyranthes aspera* Linn) extract curing
3. Sun curing
4. Covering with black plastic (cheaper alternative to jute sack)
5. Non wounded or bruised tubers were used as control
Figures 2: Control/Untreated tubers (a); Sun curing tubers (b); Clay slurry curing tubers (c); Black seed curing tuber (d) and black plastic sack curing tubers (e)
• **Curing and Storage periods:** curing lasted for 10 days while storage period was from 30 to 120 days. Weights of tubers were taken at 10 days after curing and at 30 days, 60 days and 120 days storage periods.

• **Weight of yam tubers:** Weights of the fresh tubers (before and during storage) were taken using a manual weigh scale.

• **Temperature and relative humidity:** hourly temperature and relative humidity within the yam barns were recorded with using a LASCAR data logger (EL-USB-1).

• Mean values after 10 days curing and subsequent storage periods were recorded.

• **Sprout control:** sprout was controlled by manual hand picking at every 30 days storage period.
Results and Discussions

• Curing after ten(10) days showed that sun curing and black plastic sack curing were not effective as browning reactions on the sliced tubers were noticed.

• Sprout initiation on tubers and high condensation was observed under the black plastic. This may be attributed to high temperature (> 45C) and high relative humidity (> 100%) during the curing period.

• Clay slurry curing was most effective as average weight loss of tubers were generally low (2.19% in *D. rotundata*, 1.02% in *D. alata* and 9.15% in *D. bulbifera*).

• Weight loss of tubers during subsequent storage was also lowest in clay slurry treated ones. However, weight loss in *D. alata* was lowest with black seed treatment followed by clay slurry.

• There was a significant difference (P<0.05) in tuber weight loss as days of storage increased.
Table 1: Effects of curing and on-farm storage on tuber weight loss (%) of three yam species

<table>
<thead>
<tr>
<th>Storage days</th>
<th>Control</th>
<th>Black seed</th>
<th>Clay</th>
<th>Sun curing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>D. rotundata</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2.27c</td>
<td>10.88c</td>
<td>2.19c</td>
<td>8.52c</td>
</tr>
<tr>
<td>30</td>
<td>26.41b</td>
<td>18.46b</td>
<td>15.76b</td>
<td>17.29b</td>
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<tr>
<td>60</td>
<td>39.45a</td>
<td>36.40a</td>
<td><strong>33.43a</strong></td>
<td>61.65a</td>
</tr>
<tr>
<td>LSD (0.05%)</td>
<td>0.06</td>
<td>0.46</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>D. alata</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2.56c</td>
<td>13.03c</td>
<td><strong>1.02c</strong></td>
<td>1.00c</td>
</tr>
<tr>
<td>30</td>
<td>26.21b</td>
<td>15.95b</td>
<td>25.89b</td>
<td>20.64b</td>
</tr>
<tr>
<td>60</td>
<td>35.48a</td>
<td><strong>16.04a</strong></td>
<td>34.52a</td>
<td>29.24a</td>
</tr>
<tr>
<td>LSD (0.05%)</td>
<td>0.04</td>
<td>0.06</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>D. bulbifera</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1.00c</td>
<td>14.95c</td>
<td><strong>9.15c</strong></td>
<td>22.80c</td>
</tr>
<tr>
<td>30</td>
<td>32.52b</td>
<td>23.08b</td>
<td>31.64b</td>
<td>34.43b</td>
</tr>
<tr>
<td>60</td>
<td>40.78a</td>
<td><strong>29.23a</strong></td>
<td>37.85a</td>
<td>56.60a</td>
</tr>
<tr>
<td>LSD (0.05%)</td>
<td>0.03</td>
<td>0.05</td>
<td>0.05</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Mean values down the columns with the different subscripts are significantly different (P<0.05).
Figures 4: Discoloration in *D. rotundata* after 10 days sun curing

Figures 5: Sprout initiation, surface browning and condensed environment using temperature humidity probe to cure yam tubers
Conclusion and Recommendation

• Though, some of the treatments (clay and black seed curing) were effective but varied among the yam species.
• Black plastic is not suitable for promoting curing by maintaining high humidity because it can lead to condensation and rotting.
• Sun curing practised by many farmers is detrimental to quality.
• The study recommends further research to ascertain the better treatments, suitable temperature and relative humidity for effective wound healing for the different yam varieties among species that are commonly cultivated and consumed.
• Also, sprout rate must be controlled to a minimal level as this contributed to tuber weight loss and rot.
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