Sweetpotato Yield Estimation using Crop Cut Method in Malawi (2019)

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Introduction

• Need to monitor SP yields: improve productivity; check for sustainability; and profitability of new varieties

• Involves both estimation of the crop area and the quantity of SP obtained from that area

• Some common ways of estimating yield:
  — Crop cuts;
  — Farmer estimates; and
  — On-farm trials or demonstration plots

• Accurate measurement of the productivity of the 6 improved OFSP varieties in Malawi
Method

• Conducted between April - May 2019 in all the 3 regions of Malawi & in 5 / 8 Agricultural Development Divisions (ADDs)

• Purposively selected 12 / 14 Agro-Ecological Zones

• Beneficiaries of years of CIP interventions through various projects

• The data was collected during the 2 visits; monitoring and harvest, using an ODK developed CAPI
Results - Demographics

- Target 768 cuts; 579 harvest visits; 75.4% of the targeted sample size

- 18 Extension Planning Areas (EPAs); 64 sections and 158 villages

- 2 AEZs in the Northern part had poor representation
  - Nkhata Bay, Mzuzu (5.2%)
  - Chintheche, Chikwangava, Wenya (4.8%)

- *Ana Akwanire, Mathuthu, and Zondeni* unavailable in most AEZs; *Ana Akwanire* missed totally in 6 AEZs
Results – SP Plots

• In addition to 6 OFSP and Kenya varieties, 28 local varieties were cut from farmers plots
• 56% plots managed by men
• 30% of farmers got planting materials from male farmers; 21% government; 17% own source
• Labelling of sourced vines a big challenge – 69%
• 91% farmers doing rotational farming
• Less than 2% applied fertilisers or sprayed to control pests
• Plant spacing varied across AEZs with 30 cms and 100 cms common
• Months to harvest mean was 3.6 months
## Foliage Yield

<table>
<thead>
<tr>
<th>Overall Yield – Mean [SD]</th>
<th>Non-OFSP Varieties</th>
<th>13.5 [8.0] 5.5 [3.2]</th>
<th>0.002</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OFSP Varieties</td>
<td>11.4 [7.2] 4.6 [2.9]</td>
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<td>Ana Akwanire</td>
<td>9.0 [5.9]</td>
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<td>3.6 [2.4]</td>
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<td>Kadyaubwerere</td>
<td>10.9 [7.1]</td>
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<td>4.4 [2.9]</td>
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<td>Kaphulira</td>
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<td>4.9 [3.0]</td>
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<td>Mathuthu</td>
<td>8.4 [5.8]</td>
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<td>3.4 [2.4]</td>
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<td>Zondeni</td>
<td>10.1 [6.2]</td>
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<td>4.1 [2.5]</td>
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<td>Kenya</td>
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<td>5.5 [3.1]</td>
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<td>Chipika</td>
<td>12.2 [7.2]</td>
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<td>4.9 [2.9]</td>
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<tr>
<td>Local</td>
<td>13.4 [8.2]</td>
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<td>5.4 [3.3]</td>
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<tr>
<td>Overall Yield – Mean [SD]</td>
<td>8.8 [6.3]</td>
<td>3.6 [2.6]</td>
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<td>Non-OFSP Varieties</td>
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<td>3.7 [2.7]</td>
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<td>0.5</td>
</tr>
</tbody>
</table>

### Ana Akwanire
- Mean: 8.6 [5.5]
- SD: 3.5 [2.2]

### Kadyaubwerere
- Mean: 7.9 [5.3]
- SD: 3.2 [2.1]

### Kaphulira
- Mean: 9.0 [6.0]
- SD: 3.7 [2.4]

### Mathuthu
- Mean: 11.7 [10.6]
- SD: 4.8 [4.3]

### Zondeni
- Mean: 7.1 [5.8]
- SD: 2.9 [2.4]

### Kenya
- Mean: 8.4 [5.9]
- SD: 3.4 [2.4]

### Chipika
- Mean: 9.4 [5.1]
- SD: 3.8 [2.1]

### Local
- Mean: 9.8 [7.0]
- SD: 4.0 [2.9]
The largest yield was from Lilongwe Plain AEZ (section: Katope and village: Mphere). The total foliage and root weights of the Mathuthu variety were 5.1 and 24.5 Kilograms respectively and was harvested at 4 months.
NO yield was from Lilongwe East, Masiku AEZ (section: Mnkhupa and village: Chamkoma). The total foliage weight of the Semusa variety was 7.0 Kilograms and was harvested at 3 months.
Factors affecting sweetpotato production in Malawi
Linear Prediction of Root Yield (Tonnes/Ha)

Months at Harvest

Adj. Coefficient: 1.2 [0.7 – 1.8]
Adj. Coefficient: 0.3 [0.2 – 0.4]
Adj. Coefficient: 0.1 [0.1 – 0.1]
The prediction for root yield from a univariate linear regression on number of plans established (x) and x2

UnAdj. Coefficient: 

0.1 [-0.0 – 0.2]

The prediction for root yield from a multivariate linear regression

Adj. Coefficient: 

-0.2 [-0.3 - -0.1]
Conclusion

• Another statistics in SP production
  – FAOSTAT (2017) \(\rightarrow\) 20.2 tonnes per hectare
  – D. van Vugt and A.C. Frankec (2017) \(\rightarrow\) 5.9 to 9.6
  – Crop cut (2019) \(\rightarrow\) 8.9 (7.9 to 11.7)

• Difference in root production between AEZs advocates for our recommendation despite lack of power in analysis
  – Kaphulira is most promising – foliage & root; availability
  – Chipika is 2\textsuperscript{nd} option

• Timely planting of SP is vital for root production if our analysis is but just an indicator

• Confounding effect of plant density on root yield needs further investigation

• Since varieties have different maturity periods, yield assessment may have been better by harvesting each variety at the optimal harvest time