Results from Cassava Weed Management Project
02 December 2019

Presentation by
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Presentation of Digital Tools: Disruptive innovations in Cassava/Maize farming systems to policy makers
Cassava: current situation in Nigeria

- World’s largest cassava producer (59 million tonnes/year)
- Cultivation dominated by smallholder farmers (4.5 million)
- Often intercropped with yams, maize, melons or legumes
- Lifecycle encourages perennial weeds
- Poor/no weed control reduces potential yields by 40–80%
- Weeding is highly labor intensive
Project goal
To help smallholder cassava growers achieve sustainable increases in their productivity and incomes through the development and adoption of improved weed control methods.
Research:
ITA, FUNAAB, NRCRI and UAM jointly screened best weed control options

Innovation package

Agronomy
- Plant Density: 12,500 plants/ha
- Tillage: Ridge
- Fertilizer: Yes
- Herbicides
  - Merlin Total
  - Sencor Plus
  - Gardoprim Plus Gold
  - Primeextra Gold
  - Movon
  - Lagon
  - Pierce
  - Maister 61 WG
  - Maister Power
  - Select Max = Cobra
  - Fusilade Forte
  - Cobra
  - Touchdown Forte at 4L/ha
- Mechanical
  - Long hoe
  - Marits rotary weeder

Development:
Dissemination platform
- 60,000 farmers reached 2016
- 60,000 farmers to be reached in 2017
- 60,000 farmers to be reached in 2018

State extension
Service providers:
- Abia ADP
- Benue ADP
- Ogun ADP
- Oyo ADP

Private extension
service providers:
- (JDPM, Kolping)

Chemical companies
- Federal and State Agriculture Development Programs
- Spray service providers
- IITA
- FUNAAB
- UAM
- NRCRI

Thanks for helping in solving weed problems.
Agronomic measures

- **Tillage:** Ridging reduces weed biomass and has consistently positive effects on root yields.

- **Cropping system:** Sole cropping maximizes cassava yield but intercropping can maximize economic returns when maize is sold as green vegetable and not grain.

- **Fertilizer application:** Use generally increases yields but effects vary depending on site; economic return variable.

- **Variety:** The high-branching variety TME419 produces higher root yields in first season. In the second season the variety did not matter.

- **Density:** 12500 plants/ha is recommended for TME 419 (high branching type) and 14286 plants/ha for TMS 30572 (low branching type) to maximize yield.
Assessment of mechanical weeding options

- Short handled hoe (control)
- Long handled hoe (control)
- Brush cutter (weed whacker)
- Motorized rotary weeder (Mantis)
Labour requirement: Average of 4 sites

- **Labour time (days ha⁻¹ at 8 hours / day)**
  - **First weeding**:
    - Mantis: 10.57 days
    - Hoe: 17.09 days
    - *p* < 0.0127
  - **Second weeding**:
    - Mantis: 8.6 days
    - Hoe: 16.95 days
    - *p* < 0.0308

*Note: Average of 4 sites.*
Root yield: Average of 4 sites

- Mantis: Male 17.102, Female 17.292
- Hoe: Male 21.354, Female 22.069

Cassava fresh root yield (Mg ha\(^{-1}\))
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Herbicides
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- Sencor Plus
- Gardeprin Plus Gold
- Primeextra Gold
- Movon
- Lagon
- Fierce

Maister 61 WG
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Thanks for helping in solving weed problems.
Most cassava farmers don’t use, but those who do…
- Often not spraying correctly or safely
- Often not spraying the best and safest chemicals
Two Categories of Herbicides

Pre-emergent spray

Post-emergent spray
## Herbicide screening

Screening new pre- and post-emergence herbicides for efficacy and safety on cassava

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of pre-emergence herbicides screened</td>
<td>22</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>No. of post-emergence herbicides screened</td>
<td>19</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>
Herbicides selected: Provided 80 to 90% control of major weeds and no chemical residues

<table>
<thead>
<tr>
<th>Pre-emergence herbicides</th>
<th>Post-emergence herbicides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagon 575 SC</td>
<td>Fusilade Forte</td>
</tr>
<tr>
<td>Primextra Gold</td>
<td>Select Max</td>
</tr>
<tr>
<td>Fierce</td>
<td>Cobra</td>
</tr>
<tr>
<td>Gardoprim Plus Gold</td>
<td>Glyphosate</td>
</tr>
<tr>
<td>Vigor</td>
<td>MaisTer 61 WG</td>
</tr>
<tr>
<td></td>
<td>MaisTer Power OD</td>
</tr>
<tr>
<td></td>
<td>LifeLine</td>
</tr>
<tr>
<td></td>
<td>Monsoon Active</td>
</tr>
</tbody>
</table>
On-farm demonstrations were conducted in four states in Nigeria in 2016 and 2017, 2018.
On-farm trials: 3 years of data

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer practice</td>
<td>Farmers carried out their usual farm activities without interference.</td>
</tr>
<tr>
<td>Best hoe weeding practice</td>
<td>Thorough weeding was carried out in a regulated manner by either a long- or short-handed hoe.</td>
</tr>
<tr>
<td>Herbicide use</td>
<td>Herbicide was applied either pre-emergence, post-emergence or both.</td>
</tr>
</tbody>
</table>
Results: 2016
2016 Results

- 27% increase compared to best hand weeding techniques
- 102% increase compared to typical farmer weeding practice
Results: Yield in 2017 & 2018
Cassava/Maize Intercrop
Cassava Yield 2017: Herbicide vs Farmer Practice

Monocrop

<table>
<thead>
<tr>
<th>Root yield (t/ha)</th>
<th>Herbicide</th>
<th>Farmer practice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
</tbody>
</table>

Intercrop

<table>
<thead>
<tr>
<th>Root yield (t/ha)</th>
<th>Herbicide</th>
<th>Farmer practice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
</tr>
</tbody>
</table>
Cassava yield: Average of 4 states

**Monocrop**

- **Sencor Plus**: a
- **Fierce**: ab
- **Merlin Total**: b
- **Gardoprim Plus Gold**: b
- **Primextra Gold**: bc
- **Movon**: c
- **Farmer practise**: d

**Intercrop**

- **Primextra Gold**: a
- **Fierce**: a
- **Lagon**: a
- **Gardoprim Plus Gold**: b
- **Farmer practice**: b
Cassava field in Benue
(4 weeks after planting without herbicide)
Cassava field in Benue
(4 weeks after planting with Lagon)
Cassava treated with LAGON 16 WAP
Results: Net profit
Costs

- Should one pay laborers to hand weed a field or pay for herbicide?
- Which is more expensive for the farmer?
- Cost of one manual weeding: 10,000 – 25,000 Naira per acre ($28 - $69) plus cost of feeding workers.
- Cost of herbicide: 2,400 – 8,000 Naira per acre ($7 - $22)
- Cost of paying spray applicator per acre: 2,000 Naira ($6)
Farmers found average net profits increased by **48%** when using herbicides on cassava/maize intercrop compared to best hoe weeding practice.
Farmers found average net profits increased by **83%** when using herbicides on monocrop cassava compared to best practice weeding.
## Commercialization of Herbicides

<table>
<thead>
<tr>
<th>Pre-emergence</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagon</td>
<td>Available &amp; registered [Bayer]</td>
</tr>
<tr>
<td>Vigor</td>
<td>Available &amp; registered [SARO]</td>
</tr>
<tr>
<td>Primextra Gold</td>
<td>Available &amp; registered [Syngenta]</td>
</tr>
<tr>
<td>Gardoprim Plus Gold</td>
<td>Could be made available [Syngenta]</td>
</tr>
<tr>
<td>Fierce</td>
<td>Could be made available [Valent]</td>
</tr>
<tr>
<td>SARO is discussing registration with Kumia</td>
<td></td>
</tr>
</tbody>
</table>

### Post-emergence

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fusilade Forte</td>
<td>Available &amp; registered [Syngenta]</td>
</tr>
<tr>
<td>Select</td>
<td>Could be made available [UPL]</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>Available &amp; registered [multiple]</td>
</tr>
<tr>
<td>Monsoon Active</td>
<td>Could be made available [Bayer]</td>
</tr>
<tr>
<td>Lifeline</td>
<td>Available &amp; registered [UPL]</td>
</tr>
</tbody>
</table>
Six steps to cassava weed management

1. Select a suitable site for cultivation
2. Prepare the vegetation for glyphosate application by slashing if too long.
3. Apply glyphosate at label rate to deal with perennial weeds. Wait for 14 days.
4. Prepare the field for planting.
5. Plant the cassava and apply pre-emergence herbicide. Replace cuttings that fail to sprout after 15 – 21 days.
6. When weeds cover 30% of field, apply a post-emergence weed control.
Getting good practice into use
- our out scaling model

**Demos**
- Agrodealers
- Spray service providers
- FFDs
- Extension Agents

**Multimedia**
- Radio
- Television
- WhatsApp
- Social media
- Video
- IVR (3-2-1)

**Government**
- State
- Federal (FMARD)
- Local Government

**Partnerships**
- BIP
- Bayer
- Syngenta
- UPL

**Out scaling model**
- AGRA, TAAT, Projects,
  Farmer groups
Outreach materials

Examples include:

- Extension leaflets
- Village boards
- Social media
- Newspapers
- Video
- Television and radio
Farmer field training
Training on safe use
Trained 659 Spray Service Providers (SSPs)*

- Abia 105 SSP participants
- Benue 101 SSP participants
- Ogun 122 SSP participants
- Oyo 331 SSP participants

* Work done in partnership with the National Agency for Food and Drug Administration and Control
IITA Herbicide Calculator
Six Steps & Best Planting Video
Farming on Radio
Viamo 3-2-1 IVR
IITA Herbicides Calculator
Paper-based tools
How to set up your cassava e-Market store

Setting up your store on the platform is as easy as ABC

- Simply go to www.cassavamatters.org
- On the menu bar, click e-Market
- Scroll down and click on NEW VENDOR REGISTRATION and go through the instructions
Advocacy for de-registration of paraquat in Nigeria

By promoting safer, effective alternatives: Monsoon and Lifeline

Result: No more import permits for paraquat!
Number of people reached 2016-2018

- 72,663 Farmer training
- 126,530 Print materials
- 221,757 Digital media
- 2,900,000 Radio stations
- 20,000,000 TV documentary
What does this mean for farmers?

- Improved food security
- Less drudgery for families
- More money in their pockets
- More time and money for other activities
- More cassava to serve processing industry
Acknowledgements

Principal investigator

Implementing partners

Abia Agricultural Development Programme

Benue Agricultural and Rural Development Authority

Federal Ministry of Agriculture and Rural Development, Nigeria

Justice Peace Development Movement Abeokuta Diocese

Justice Peace Development Movement Oyo Diocese

Kolping Nigeria

Ogun State Agricultural Development Programme

Oyo State Agricultural Programme

Funded by
Thank You