Welcome to the 2020 annual review meeting of the African Cassava Agronomy Initiative

1 – 3 December 2020
AKILIMO: a digital service to provide tailored agronomic advice
AKILIMO: a digital service to provide tailored agronomic advice
Second season validation results
Second season validation results

- Tailored fertilizer recommendations
- Cassava-sweet potato intercropping
- Cassava-maize intercropping
- Scheduled planting and harvest
- Best planting practices
Improvements to the AKILIMO prediction engine

LINTUL/DSSAT
- Geospatial weather data
- Geospatial soil data

QUEFTS
- Farmer knowledge
- Geospatial price data

Economic Optimizer
- Available fertilizers
- Fertilizer (N, P, K) rates
- Yield response to (N, P, K)
- Nutrient-limited yield
- Water-limited yield
- Max. investment
- Crop production price
- Crop price
- Net revenue maximization

with total cost ≤ max. investment
AKILIMO: a digital service to provide tailored agronomic advice
Download the AKILIMO app for android
Visit [www.akilimo.org](http://www.akilimo.org) and download our printable guides
Use the AKILIMO worksheets to calculate recommendations yourself

Recommendations for cassava-maize intercropping

Farmer’s worksheet

1. **Plant the right cassava variety**
   - Choose a disease-resistant variety like 'MN149' or 'MN1516'.
   - Plant your cassava at 1.5 feet (60 cm) between rows and 60 cm within rows.

2. **Plant the right maize variety**
   - Choose a short-duration variety that matures in 90 days ('SMH120' or 'SMH141').

3. **Plant maize at the right density**
   - Use your knowledge of how maize would grow without fertilizer.
   - Decide the number of plants you want to plant per acre.

4. **Consider applying fertilizer**
   - Apply fertilizer to increase yield.

5. **Find an attractive market for your produce**
   - Sell your produce at a price that is competitive with market prices.

**Farm Name**

1. **Recommended doses** (in kg/ha)
   - Phosphorus (P2O5): 30 kg/ha
   - Potassium (K2O): 40 kg/ha
   - Nitrogen (N): 50 kg/ha

2. **Fertilizer effects**
   - Increase yield by 50%.

3. **Achieved yield**
   - Cassava: 4.5 tons/ha
   - Maize: 6.5 tons/ha

**Notes**

- Apply the recommended doses at planting to achieve maximum yield.
- Regular monitoring of crop growth is crucial for effective management.
- Always use quality seeds and compost to improve soil health.

Scheduled planting and harvest recommendations

Farmer’s worksheet

1. **Decide when to plant**
   - Cassava: Early in the dry season.
   - Maize: Late in the dry season.

2. **Clear and prepare your land**
   - Remove all weeds and debris.

3. **Plant the right cassava variety**
   - 'MN149' or 'MN1516' preferred.

4. **Consider applying fertilizer**
   - Apply NPK at the rate of 50-40-30 kg/ha.

5. **Find an attractive market for your produce**
   - Sell your produce at competitive prices.

**Farm Name**

1. **Recommended doses** (in kg/ha)
   - Phosphorus (P2O5): 30 kg/ha
   - Potassium (K2O): 40 kg/ha
   - Nitrogen (N): 50 kg/ha

Tailored fertilizer recommendations

Farmer’s worksheet

1. **Apply good agronomic practices**
   - Plant disease-resistant varieties.
   - Practice good land preparation.

2. **Choose the right fertilizer types**
   - Use urea (N) or TSP (P2O5 + K2O).

3. **Obtain the recommended fertilizer rate**
   - Consult the AKILIMO tool to get the recommended rate for your soil type and planting date.
Our digital partners also offer AKILIMO advice
AKILIMO: a digital service to provide tailored agronomic advice
Progress with scaling and dissemination
Progress with scaling and dissemination

Lessons from scaling: progress by primary partners

Reaching next users: connecting with secondary partners

Direct farmer engagement: mobile learning by digital partners

Steps towards sustainability: integration into extension services
ME&L lessons from reach, use and uptake

...were reached → ...gained insights → ...continued using the tools → ...changed their practices → ...benefited

Tanzania
- High (10.1%)
- Medium (46.1%)
- Low (43.7%)

Nigeria
- High (62%)
- Medium (20%)
- Low (18%)

$
Targets for impact and dissemination
What did we seek to achieve?

By 2020, at least 173,000 cassava farmers are benefiting from a total value created of at least 32.1 M USD through higher cassava yields, higher yields of crops associated with cassava, higher starch content of cassava roots, a more continuous supply of roots, the use of appropriate cassava fertilizer, and/or use of integrated weed control technologies within the target areas of the primary partners in Nigeria and Tanzania.

<table>
<thead>
<tr>
<th>Target:</th>
<th>+2,500 t</th>
<th>+8 t/ha</th>
<th>+2 t/ha</th>
<th>+4 t/ha</th>
<th>+6 t/ha</th>
<th>+10 tonnes</th>
<th>+5 tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>new cassava fertilizer blend</td>
<td>additional cassava root yield</td>
<td>additional root yield, and +500 kg/ha additional intercrop yield</td>
<td>additional cassava root yield (or equivalent cost savings)</td>
<td>additional cassava root yield (or equivalent cost savings)</td>
<td>additional supply of cassava roots to the processing industry</td>
<td>additional supply of cassava starch to the processing industry</td>
<td></td>
</tr>
<tr>
<td>Number of households impacted:</td>
<td>NA</td>
<td>28,200</td>
<td>35,100</td>
<td>42,900</td>
<td>53,625</td>
<td>6,563</td>
<td>7,700</td>
</tr>
<tr>
<td>Value generated [M USD]:</td>
<td>2.3</td>
<td>2.2</td>
<td>3.9</td>
<td>2.1</td>
<td>4.1</td>
<td>3.3</td>
<td>2.9</td>
</tr>
</tbody>
</table>
What are the conditions?

- AKILIMO used by primary partners with target smallholder farmers – 426,150
- 15 new partners/initiatives besides the primary partners are adapting and using AKILIMO with 40,000 households
- 400,000 households are aware of Integrated Weed Control options

<table>
<thead>
<tr>
<th>Uptake rate (%)</th>
<th>30</th>
<th>75</th>
<th>40</th>
<th>35</th>
<th>35</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Extension Agents involved:</td>
<td>NA</td>
<td>445</td>
<td>124</td>
<td>496</td>
<td>680</td>
<td>150</td>
</tr>
<tr>
<td>Number of farmers reached (direct dissemination)</td>
<td>NA</td>
<td>94,000</td>
<td>46,800</td>
<td>104,200</td>
<td>147,000</td>
<td>18,750</td>
</tr>
<tr>
<td>Number of farmers reached through new initiatives/partners:</td>
<td>40,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of farmers reached (digital channels - YouTube, Facebook, Twitter, etc): 400,000
How do we get there?

Farmer-friendly videos, supporting materials:
10,00 DVDs, 8 sensitization events organised, supporting materials developed

Grassroot events organized:
10 primary partners,
2 events/use case,
50 video viewing centres/50 viewers

Awareness campaigns, promotion events:
12 convenings, 40 new initiatives aware of ACAI

Training events:
12 ToTs,
1,939 EAs trained

Suite of extension tools:
24 radio broadcasts, 52,500 followers,
20,000 IVR/USSD,
12 videos uploaded on YouTube

Training events for new partners/government extension:
400 EAs trained
How are we quantifying results?

Farmers reached...gained insights...Use...uptake...benefited (yield, income)

... and understand why (not)!

event registration; reports for digital platforms

telephone surveys: sampled registered participants from events; integrate learning questions into digital platforms

Validation results: quantify yield increases and proportion of farmers benefiting (based on farmer-reported prices)
Monitoring, evaluation and learning: reach, use and uptake

AKILIMO
we know cassava
We want to track farmers who...

...were reached

...gained insights

...continued using the tools

...changed their practices

...benefited

... and understand why (not)!

Learning by doing: our ME&L framework
Learning by doing: our ME&L framework

We want to track farmers who... 

reach 

...were reached

use 

...gained insights

...continued using the tools

uptake 

...changed their practices

...benefited

... and understand why (not)!
# Total reach by gender and country

Number of attendees (counted by monitors): 154,293

<table>
<thead>
<tr>
<th></th>
<th>#female users</th>
<th>#male users</th>
<th>%female users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria</td>
<td>35,689</td>
<td>55,027</td>
<td>39%</td>
</tr>
<tr>
<td>Tanzania*</td>
<td>21,590</td>
<td>41,987</td>
<td>34%</td>
</tr>
</tbody>
</table>

Number of registered users (with subscription details): 122,958

<table>
<thead>
<tr>
<th></th>
<th>#female users</th>
<th>#male users</th>
<th>%female users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria</td>
<td>24,678</td>
<td>39,655</td>
<td>38%</td>
</tr>
<tr>
<td>Tanzania*</td>
<td>18,420</td>
<td>40,205</td>
<td>31%</td>
</tr>
</tbody>
</table>

Tanzania numbers include registered users shared with eSOKO, but not from VIAMO or Arifu.
Reach by partner

Top 10 partners with highest reach

<table>
<thead>
<tr>
<th>Partner Tanzania</th>
<th>F</th>
<th>M</th>
<th>total</th>
<th>Partner Nigeria</th>
<th>F</th>
<th>M</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>eSOKO</td>
<td>5,602</td>
<td>15,594</td>
<td>21,196</td>
<td>FUAM</td>
<td>5,006</td>
<td>8,855</td>
<td>13,861</td>
</tr>
<tr>
<td>TFNC</td>
<td>3,833</td>
<td>7,992</td>
<td>11,825</td>
<td>SG2000</td>
<td>4,499</td>
<td>5,969</td>
<td>10,468</td>
</tr>
<tr>
<td>MEDA</td>
<td>2,481</td>
<td>5,807</td>
<td>8,288</td>
<td>Notore</td>
<td>3,160</td>
<td>5,422</td>
<td>8,582</td>
</tr>
<tr>
<td>FCI</td>
<td>2,924</td>
<td>3,443</td>
<td>6,367</td>
<td>KOLPING</td>
<td>4,119</td>
<td>2,858</td>
<td>6,977</td>
</tr>
<tr>
<td>Kilimo Joint</td>
<td>1,047</td>
<td>2,188</td>
<td>3,235</td>
<td>Psaltry</td>
<td>1,724</td>
<td>4,273</td>
<td>5,997</td>
</tr>
<tr>
<td>CAVAI1</td>
<td>411</td>
<td>1,294</td>
<td>1,705</td>
<td>OYSADEP</td>
<td>1,624</td>
<td>3,157</td>
<td>4,781</td>
</tr>
<tr>
<td>KOLPING</td>
<td>682</td>
<td>994</td>
<td>1,676</td>
<td>JDPM</td>
<td>1,503</td>
<td>2,929</td>
<td>4,432</td>
</tr>
<tr>
<td>IITA</td>
<td>306</td>
<td>591</td>
<td>897</td>
<td>OYSCGA</td>
<td>1,006</td>
<td>2,255</td>
<td>3,261</td>
</tr>
<tr>
<td>Minjingu</td>
<td>145</td>
<td>548</td>
<td>693</td>
<td>CAVAI1</td>
<td>1174</td>
<td>2,022</td>
<td>3,196</td>
</tr>
<tr>
<td>Lindi District Council</td>
<td>298</td>
<td>328</td>
<td>626</td>
<td>Gemehaam Bees Limited</td>
<td>370</td>
<td>784</td>
<td>1,154</td>
</tr>
<tr>
<td>Others</td>
<td>691</td>
<td>1,426</td>
<td>2,117</td>
<td>Others</td>
<td>493</td>
<td>1,131</td>
<td>1,624</td>
</tr>
</tbody>
</table>

Other partners in Tanzania include FJS, Handeni District Council, YARA, Bunda District Council, Jv biotech enterprises company limited, TARI, Biaramulo District Council, Independent farmers, Bagamoyo District Council, TYEGD, Chalinze District Council.

Other partners in Nigeria include OAU, IITA, Cedro Royal, SOLADUKE AGRO ALLIED VENTURES, National Cassava Growers Association, Delta State, Cato foods, GIZ, IEVPS, ADP, NRCRI, Jairus Ogbe, OGADEP, Perfect Impact, UAM.
Reach by dissemination event

Nigeria
Mainly video shows, sensitization and training events

Tanzania
Mainly SMS, agric shows and video shows
Reach by use case

Note: Some dissemination events cover more than one use case, hence participation is counted separately for each use case.
Reach by the AKILIMO app

mainly used by extension workers providing services to cassava growers

1,276 users
43% female users
33,984 requests
Reach by the AKILIMO app

Use by gender and age

Nr of active users

AKILIMO can assist you with personalized advice to grow and improve the yield of your cassava once you provide me some essential information.
Monitoring use and uptake

• >1,500 telephone interviews: stratified randomized sampling frame with equal proportions by gender and event types, and proportional sampling of partners within these factors.

• Use ~ Have you used the tools again after the AKILIMO event?
  • Low = no, never
  • Medium = yes, 1-2 times
  • High = yes, 3 times or more

• Uptake ~ Have you applied the recommendations in your farm? (asked separately for each of 6 steps, then aggregated)
  • Low = [0, 0.25): not applied
  • Medium = [0.25, 0.75): partially applied or with major modifications
  • High = [0.75, 1]: fully and strictly applied as recommended
Monitoring use and uptake

- Participant characteristics:
  - gender, age and education
  - wealth status indicators (incl. land area, ownership,…)
  - commercial / subsistence farming orientation
  - access to extension services
  - access to market

- Knowledge and behaviour ~ agreement with statements / perceptions on various aspects of the tools
  These relate to user-friendliness of the tools, relevance of the recommendations, trust and perceptions on yield and revenue increase, perceptions on cost, risk and affordability, market access and commercial interest, and attitude towards innovation.
Overall use and uptake

Pie donut plots with use of the DS tools in the pies, and uptake of the recommendations in the donuts

Substantially higher use and uptake in Nigeria than in Tanzania

High use generally translates in high or medium uptake

<table>
<thead>
<tr>
<th>Use of tools</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Medium</td>
<td>6</td>
<td>6</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>High</td>
<td>6</td>
<td>15</td>
<td>41</td>
<td>62</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>25</td>
<td>57</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use of tools</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>27</td>
<td>17</td>
<td>0</td>
<td>44</td>
</tr>
<tr>
<td>Medium</td>
<td>11</td>
<td>29</td>
<td>6</td>
<td>46</td>
</tr>
<tr>
<td>High</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>51</td>
<td>11</td>
<td>100</td>
</tr>
</tbody>
</table>
Each use case has 6 recommendation “steps”. Uptake was assessed for each step, then aggregated.
Uptake by use case

Nigeria

Generally highest uptake for “Best Planting Practices and Weed Control”

Tanzania

Acai impact targets
Use and uptake by gender

Comparative use for male and female participants in both countries
Uptake generally lower for female than for male participants

Nigeria

Uptake

Tanzania

Uptake
Use and uptake by age and education

Lower use and uptake in the very young and old age categories
Example: use in Tanzania by age category

Highest use and uptake for farmers with primary or secondary education
Example: uptake in Tanzania by education level
Use and uptake by partner

Participants exposed through dissemination events of 18 different partners
Large differences in use and uptake between partners (within country)
Use and uptake by dissemination event

Differences between partners in use and uptake of AKILIMO are related to the choice of dissemination method (event type).

Uptake in Nigeria

Uptake in Tanzania

Agric show  Demo field  eSOKO  SMS  Field day  Sensitization event  Training event  Video show
Access to supporting videos

Access to farmer-friendly videos demonstrating how to apply recommendations substantially improves use and uptake in Nigeria but not in Tanzania.
Support by an extension agent on how to use the tools or apply the advice substantially improves use and uptake in both countries.

But only 3% of participants in Nigeria report to have access to an extension worker (contrary to Tanzania where 51% report to have access to extension services).
Proportion of income from cassava

Higher use and uptake for commercial cassava growers who obtain a large proportion of income from cassava (especially in Tanzania)
Perceptions and behaviour

Participants were asked whether they agree with 32 statements related to

- User-friendliness of the tools (UX)
- Relevance of the recommendations
- Trust in yield and revenue improvements
- Cost and risk implications
- Access to market and sale of produce
- Attitude towards innovation
Perceptions and behaviour (examples)

Nigeria Use Uptake

I am able to apply the tools on my own.

AKILIMO presents recommendations in a clear and comprehensible way.

I am able to talk to an extension agent to learn more about the AKILIMO tools or obtain an AKILIMO recommendation.

I can access credit facilities to purchase inputs or hire services to invest in my farm.

I regularly interact with projects and services that teach about improved practices.

Tanzania Use Uptake

S

trongly disagree

Disagree

Neither agree nor disagree

Agree

Strongly agree
Perceptions and behaviour

A machine-learning algorithm (random forest) can relate differences in use and uptake to attitude and behaviour with >80% accuracy.

Differences in use and uptake are related to different aspects of attitude and behaviour. Relevance of specific aspects differ strongly between Nigeria and Tanzania…
## Perceptions and behaviour

<table>
<thead>
<tr>
<th></th>
<th>Nigeria</th>
<th>Top 3 most discriminating statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td>1</td>
<td>I am able to talk to an extension agent to learn more about the AKILIMO tools or obtain a recommendation.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I am able to access the AKILIMO tools on my own.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>The recommended practice will increase my yield.</td>
</tr>
<tr>
<td>Uptake</td>
<td>1</td>
<td>I require additional training and information from an extension agent to be able to apply the recommendations.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>The dissemination event was organized at a relevant time to allow me to apply the knowledge in my farm.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I am sufficiently informed about the recommended practice to be able to implement it.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Tanzania</th>
<th>Top 3 most discriminating statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td>1</td>
<td>I can access credit facilities to purchase inputs or hire services to invest in my farm.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I farm today in the same way as I did 4 years ago.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I cannot afford the cost of transporting my cassava produce to the market.</td>
</tr>
<tr>
<td>Uptake</td>
<td>1</td>
<td>I can access credit facilities to purchase inputs or hire services to invest in my farm.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>I have made changes and substantial investments in my farm during the past 4 years.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I am able to apply the AKILIMO tool on my own.</td>
</tr>
</tbody>
</table>
Perceptions and behaviour

In Nigeria...
• Access to more training, information and support by an extension agent is most critical.
• Next is a positive user experience (independent access, quick and easy use of the tools).
• Third is trust in the recommendations to result in increased yield and revenue.
• Aspects related to cost, risk and market access do not feature in the top 10.

In Tanzania...
• Access to credit and service providers is most critical.
• Next is attitude towards innovation (investments in the farm and use of technology)
• Third is a positive user experience (independent access, quick and easy use of the tools).
• Access to an attractive market for cassava is also very discriminative.
• Perceptions around yield and revenue increase do not feature in top 10…
Conclusions

• Reach, use and uptake can be quantified across the partnership. Methods used are standardized and relatively inexpensive.

• Intensive use generally translates in high uptake. Interventions that stimulate frequent use will also increase application of the advice.

• Use and uptake differ substantially between Nigeria and Tanzania, and between cassava growers within each country.

• Insights in use and uptake can assist in
  • targeting dissemination efforts (e.g., target younger, more innovative, commercially-oriented cassava growers in Tanzania)
  • prioritising further development (e.g., invest further efforts in improving the UX and access to the tools)
  • attracting complementary services (e.g., bundle AKILIMO with credit provision in Tanzania, and training support in Nigeria)