MAIZE STEM BORERS AND STRIGA MANAGEMENT IN TANZANIA USING PUSH-PULL TECHNOLOGY

Presented in Annual Review and Planning meeting on Rice, Maize and Chickpeas IPM Project for East Africa.
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Content

• Maize production in Tanzania
• Major constraints to maize production in TZ
• Main cereal stemborers and striga weeds in TZ.
• Management measures- Push pull technology
• Results/achievement made
• Lesson learnt
• Plan of activities 2018/19
Maize production in Tanzania

- Maize is the major staple food for majority of Tanzanians
- 80% is produced by small scale farmers and is grown both for subsistence as well as cash crop.
- 65% is consumed within the country
- 35% enters commercial channels
Major constraints to maize production

• Major production constraints include pests, diseases, weeds (striga) and low soil fertility
• Major pests include field and storage pests.

• Field pests include: Cereal stem borers (*Chilo partelus, Buseola fusca*) and Fall armyworm (*Spodoptera frugiperda*)
Main cereal stemborers spp in Tanzania

– *Chilo partellus* (Swinhoe) Lepidoptera; Crambidae
– *Buseola fusca* (Fuller) Lepidoptera; Noctuidae
– *Sesamia calamistis* (Hampson) Lepidoptera; Noctuidae
– *Eldana saccharina* (walker) Lepidoptera; Pyralidae
– *Chilo orichalcociliellus* (strand) Lepidoptera; Crambidae

Striga weed spps

Three economic important species of Striga weed.

- *Striga hermonthica* (Lake zone) of Tanzania
- *S. Asiatica* (Eastern and central zones of Tanzania)
- *S. Forbesii* (upland rice-parts of Morogoro region and Mbeya region (Kyela district))
Yield loss

CEREAL STEMBORERS
• In TZ. cause yield losses 30-53% on maize (Muyango, 1987, Mgoo. et. al. 2005)

STRIGA WEED
• In TZ. cause crop yield loss of btn 20-90% depending on the level of infestation (Mbwaga et. al, 2000)
Project Objectives

• To increase maize production through dissemination of Push pull Technology to reduce effects of stemborers and striga weed.

• Awareness creation to project farmers, extension agents and other stakeholders on push-pull technology

• Training of project farmers and extension agents on use and benefits of Push-pull Technology
Project sites-Morogoro Rural and Mvomero districts
## Some of project demonstration sites for 2018

<table>
<thead>
<tr>
<th>District</th>
<th>Villages</th>
<th>GPS reading</th>
<th>Altitude</th>
<th>Farmer’s/group name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morogoro Rural</td>
<td>kibangile</td>
<td>S 07°02.259’ E 037°49.065’</td>
<td>248 m</td>
<td>Veronica Willium</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>kibangile</td>
<td>S 07°01.993’ E 037°48.227’</td>
<td>218 m</td>
<td>Kibangile primary school</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>Kibangile</td>
<td>S 07°02.573’ E 037°47.645’</td>
<td>257 m</td>
<td>Ramadhani Bakari</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>Mkambarani</td>
<td>S 06°46.714’ E 037°48.3408’</td>
<td>460 m</td>
<td>Zuberi Mohamedi</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>Kiswila</td>
<td>S 07°03.267’ E 037°45.857’</td>
<td>265 m</td>
<td>Kuku na mboga group</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>Kiswila</td>
<td>S 07°3.327’ E 037°46.03’</td>
<td>282 m</td>
<td>Martin Wenderin</td>
</tr>
<tr>
<td>Mvomero</td>
<td>Kangazi</td>
<td>S07°05.974’ E037°46.724’</td>
<td>394 m</td>
<td>Agatha Felix</td>
</tr>
<tr>
<td>Mvomero</td>
<td>Turian Mtibwa</td>
<td>S 06°08.023’ E 037°40.515’</td>
<td>381 m</td>
<td>KKK Choir</td>
</tr>
<tr>
<td>District</td>
<td>Village</td>
<td>GPS reading</td>
<td>Altitude</td>
<td>Farmers/group name</td>
</tr>
<tr>
<td>------------------</td>
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<td>-------------------</td>
</tr>
<tr>
<td>Mvomero</td>
<td>Makuyu</td>
<td>S 006°19.091’ E 037°23.117’</td>
<td>444 m</td>
<td>MVIWATA</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>mtamba</td>
<td>S 07006.189’ E 037046.813’</td>
<td>372 m</td>
<td>Mfaume Hamza</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>Mtamba</td>
<td>S 07°05.211’ E 037°46.270’</td>
<td>366 m</td>
<td>Mtamba Primary school</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>Lundi</td>
<td>S 07°07.224’ E 037°48.603’</td>
<td>349 m</td>
<td>Lundi secondary school</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>Lubungo</td>
<td>S 06°43.448’ E 037°55.432’</td>
<td>389 m</td>
<td>Rehema Ramadhan</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>Lubungo</td>
<td>S 07°02.437’ E037°48.674,</td>
<td>387 m</td>
<td>Mganga Kiemba</td>
</tr>
<tr>
<td>Morogoro Rural</td>
<td>Mtego wa simba</td>
<td>S 06°46.648’ E 037°51.592’</td>
<td>440 m</td>
<td>Kulwa Abdallah</td>
</tr>
</tbody>
</table>
Push –pull Technology implementation stages:

a) Awareness creation to farmers and Extension staff

Farmers and extension agents in Kibangile village – Morogoro district

Farmers and extension agents in Kingazi village – Mvomero district
b) Push-pull layout and planting

Mtombozi village in Morogoro district
c) Desmodium gap filling, fertilizer application and Weeding in Kiswila village Morogoro district
Local international collaborators

• Tanzania NAFAKA Project- Is a component of USAID’s Feed the Future initiative.
• Charged with development of efficient market systems for rice and maize producers
• Area of work: Morogoro region in Mvomero district
• Collaboration: Formation of farmers groups and training
Data collection

- Plant height, Exit holes, tunnel length
Cont

• Striga count per plant

• And maize weight/plot
Results/Achievements made

• 25 extension staff and lead farmers were trained on Push pull technology

• Total of 101 (61 female 40 male) people attended farmers field day at Kiswila village in Morogoro district

• 11 sites for 2017
• 43 sites for 2018
• 215 farmers are benefiting from the technology
Cont,

• More than 250 people (165 Female 85 male) visited push pull demonstration plot during National Farmers Agricultural Exhibition days (nane nane 1st-8th August 2017 in Morogoro) and were briefed on benefits of push-pull technology

• 250 English and Swahili leaflets on Push-pull technology were distributed to farmers and other participants
5 project farmers harvested desmodium and brachiaria seeds which they used to expand their demo plots and some was sold to other non project farmers.
Cont,

- In country annual planning meeting was held in Dar es Salaam on 31st October 2017
- Technology Awareness creation was made through Abood TV in Morogoro during Nane nane Farmers Agricultural Exhibition days held in Morogoro from 1st - 8th August 2017.
- Awareness was also made throughout the country by Tanzania Broadcasting Corporation (TBC) radio in September 2017 and Feb 2018
PUSH-PULL TECHNOLOGY - TREATMENT AND CONTROL PLOTS

<table>
<thead>
<tr>
<th>Measure</th>
<th>Push Pull</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant height (m)</td>
<td>2.7</td>
<td>1.31</td>
</tr>
<tr>
<td>Exit holes</td>
<td>0.39</td>
<td>1.05</td>
</tr>
<tr>
<td>Tunnel length (cm)</td>
<td>2.32</td>
<td>4.87</td>
</tr>
<tr>
<td>Striga count</td>
<td>0.02</td>
<td>0.28</td>
</tr>
<tr>
<td>weight (ton)/acre</td>
<td>1.21</td>
<td>0.52</td>
</tr>
</tbody>
</table>

Legend:
- Push pull
- Control
Discussion

• Mean stem borer tunnel length in maize was significantly reduced by 35.47% in push–pull plot when compared to control plots.
• Mean yield per acre increased by 32.96% in push pull plots when compared to control plots.
• High stem borers tunnel length and high striga count contributed to low maize production in control plots.
Lesson learnt

- Farmers who fed their cows mixture of desmodium and brachiaria leaves increased milk from 4 to 6 per day per cow.
- Some farmers have benefited from increased maize production due to reduced striga weeds, sale of desmodium and brachiaria seeds to other non-project farmers.
- Farmers field days helped to extend push pull technology beyond project sites.
- Many farmers prefer use of Brachiaria to napier grass as a ‘Pull’ plant.
- Generally Farmers said that they have found Push-Pull to increase food security, income, education of their children and health of the family.
Challenges encountered

• Inadequate fund
• Invasion of new pest (Fall armyworm) in demo plots
• Bird scaring during seed formation for brachiaria and desmodium in the field
Plan of activities for 2018/2019

• Preparation of leaflets and posters during Farmers Agricultural Exhibition (Nane nane 1st-8th August 2018) in Morogoro.
• Awareness creation and site selection for extension of Push–pull technology in more villages in Morogoro and Mvomero districts (Nov 2018–Feb 2019)
• Planting, monitoring, training farmers and extension agents and data collection (March–June 2019)
• Technology awareness creation through farmers field days, farmers exhibitions (nane nane) and mass media (Tv and Radio programs) July–October 2019
Acknowledgment

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Thank You For your attention