PUSHI-PULL TECHNOLOGY IS THE BEST OPTION TO FIGHT AGAINST STEMBORER AND STRIGA IN ETHIOPIA

Livelihood changes of rural community: the case of Tolay, Shewa Robit and Kemissie.

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**1. SUMMARY**

Maize and Sorghum are among the major staple food crops in Ethiopia accounting **35%**, **19%** for domestic consumption and **28.2%** and **15%** local market value respectively. Ethiopia is **4th** and **3rd** in Africa in maize and sorghum production next to SA, Nigeria, Egypt and Sudan respectively. In terms of total production Maize and Sorghum are taking the lead. However, the production and productivity of the two crops remains bellow world average due to biotic and abiotic factors.

Traditional farming systems, climate change effects, the infestation of Stemborers and Striga as well as other plant pests and diseases significantly contribute to the poor performance. The sever situation in Tolay, Shewa Robit and Kemissie areas validate this argument and witnessing how farming community is exposed to food and nutrition insecurity in the coming few years.

Given this fact icipe and partners came up with environmentally friendly innovative coping strategy known as Push-Pull Technology to control the crops from Stemborer and Striga. The technology performs using two important grass families, i.e. *Desmodium* and *Brachairia*. Farmers plant, the Desmodium (push) between furrows in the Maize/Sorghum plot and Brachairia (pull) at the border to protect the Maize from stemborer.

The technology has several benefits for farmers; these include: improve productivity, soil fertility, and livestock feed, income opportunity for farmers.

**WHAT WE KNOW ABOUT PUSH-PULL TECHNOLOGY IN ETHIOPIA**

Push-Pull Technology is friendly innovative coping strategy controls Maize and Sorghum from Stemborer and Striga. In Ethiopia, the technology has been implemented since 2011. It was started in Harargie and scaled out to Jima Zone in Tolay and other areas. Now the initiative extended to the 5 major regions of the country.

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eggs and caterpillars. As a result, the crop can be safe from damage. In addition, the Desmodium also stimulates suicidal germination for Striga and suppresses the striga seeds in soil seed bank.

This technology has been tested since 2011 and replicated across Five Regions (Oromia, Amhara, Tigray, Southern & Benshangul) of Ethiopia with the support of Biovision Foundation and other several partners, including the Government of Ethiopia. Across the country, over 8,000 farmers are using the technology.

Very recently, the icipe research team and stakeholders’ tribute field visits and organized discussion forums on the implementation of the technology in the three stemborer and Striga cluster areas; namely: Tolay, Shewa Robit and Kemissie.

The field day and learning session held in Tolay on 19 October 2017 and field visit to Shewa Robit and Kemissie from 23-25 October 2017. The events were organized by the icipe Ethiopia Office to communicate the stakeholders about the technology, highlight progresses made on-farm research and adoption, and to build a vibrant community of farmers to ensure sustainable agricultural system in the region as well as across the country. This report provides a comprehensive record of the observations and reflections from the site visits held at different demonstration sites. Also, communication and Public Relation (PR) team from MoANR conducted a lesson learning visit between October 29 and 31, 2017 to Shewarobit and surrounding localities to observe and record the severity of striga infestation and lose of sorghum production. A short shot documentary film is being produced by the MoANR PR team which will be shared soon after to media and other partners.
2. FIELD DAY AND REVIEW MEETING IN TOLAY

2.1 Field Visit in Botter Tolay district

The field day took place on three icipe Push-Pull Technology (PPT) demonstration sites at Botter Tolay district of Jima Zone in Western Oromia region of Ethiopia. Maize is one of the stable food in the region, but this major crop is highly vulnerable to stemborer and diseases. icipe started the PPT in Tolay in 2013 by 20 farmers and now it reaches more than 2500 direct beneficiaries.

Farmers and stakeholders came together to see details of on-farm research and demonstration of the pioneer technology and learn from each other. This happened on 19 October 2017 with the presence of over 100 participants from government offices (federal, regional, zone and district levels) and farmers.

At the occasion, Dr. Shifa Ballo, the project coordinator; explained reason behind the presence of icipe in Tolay and the activities have been done so far. He underlined that icipe is working to increase agricultural productivity, improve livestock feeds and soil fertility through Push-Pull Technology.

Farmer, Jemal is among the beneficiaries of PPT for the past four years in Tolay. He describes about the technology with passion. “the introduction of push-pull gave us relief in controlling stemborer and improve both land and crop productivity. Furthermore, the technology is improving the livestock feed”. Likewise, new farmers also enjoying the fruits of this technology.
2.2 Review meeting

Ahead of the learning session the participants visited icipe’s training center and laboratory, documentary photographs describing various activities of the project. It was a good opportunity for the visitors to learn more about several initiatives currently in place.

The learning session was core part of the event that discussed on the activities of the project, major achievements, challenges and the way forward. The overall discussion session chaired by Yezedin, Botter Tolay district deputy administrator. He initiated the discussion by appreciating the outstanding implementation of the project. He further acknowledged the icipe for its commitments in achieving such results and successfully facilitating the learning forum in the district.

The community concern towards the technology, set of problems and passions about the technology were thoroughly discussed. The meeting was very interactive. The following were among key points were raised during the discussion and responded accordingly.

- Is it possible to integrate the use of chemical spray with PPT?
- What are major challenges the project has been facing?
- Does the PPT is repellant to other pests, for instance Fall Armyworm?
- Does Desmodium compete with Maize for moisture and nutrient?
- For how long the Desmodium and Bracharia should stay on the plot?
- Is PPT labor intensive?
- How we can full fill the demand for seed in the situation we have scarcity in the supply of seeds?

In a nutshell, the meeting served as a learning platform that promote, share experiences and lessons from project implementation and research that helps to control Stemborer in Tolay and the surrounding catchments. All the key messages of the meeting were aspiring livelihood changes of rural community through PPT.
The chairman reiterated the fact that Tolay is a place where there is significant potential for climate smart technology. This was particularly the case given that the solutions for livestock feed, improved soil fertility. Thus, solutions had to be tailored towards Push-Pull Technology, which able to change the livelihoods of smallholders. There is a clear continue improve the implementation and scaling out the project to new areas, and hence urged participants to effectively coordinate and enhance networking on Push-Pull Technology to enhance the benefits for the rural community.

Dr. Shifa remarked that since 2013, icipe has been providing the necessary capacity building, skills development, in put supply and technical supports for Extension workers and model farmers. Many premises from the field conform justifying the said supports. Now, Tolay should be the main base and power house for the expansion of the technology. This is therefore, the time is coming to handover for the local authority to play the leading role in the implementation and sustainability of the technology.
3. SHEWA ROBIT AND KEMISSIE

The compelling moments captured with camera about an elegant Striga covering the whole farm pronounces loudly about how the major Sorghum producing areas are affected by the weed. icipe is on the fore front to respond for this food security and livelihood challenges through the Push-Pull Technology. The technology has been tested in the areas since 2015 in collaboration with Wollo University, Oromia zone (Amhara region) and ISD. Implemented in Shewa Robit (Kewet Woreda) in 12 villages at 12 Farmers Training Centers (FTCs) engaging 187 farmers, while in Kemissie with 100 farmers from 10 villages and 6 FTCs. Similar intervention is taking place in Efratana Gidim Woreda where 100 model farmers and 6 FTCs are in service. The report also captured the farmers and partners opinions on the severity of the situation.
Famer Workagegnhu Zerihun in 03 village of Shewa Robit speaks about the situation with high emotions. “Since long time I used to grow different crops. This year I planted Sorghum in one ha of land expecting more than 33 quintals, but nothing to harvest from the farm, it is a total lose he said, the striga (Lelisa) ate my crop”. The land he grew this Sorghum is rented for 10,000 Birr. He calculated more than 50,000 birr (33,000 sell of sorghum +10,000 land rent + labour cost) he lost due to this striga weed. This scenario traces only one farmer, but the situation is alike for the whole
**W/R Hawa Adem** from Yelen Kebele is successful push pull farmer in Kewet Woreda who had experience visit to Kenya and Uganda. She practiced push pull since 2015 and being one of the best new technology recipient model farm for push pull in that area. She enthusiastically explained to the PR people from MoANR about the importance and usefulness of the technology. She compared her Sorghum grown under push pull and non-push pull lands. She is expecting more than 15 quintals of Sorghum from her 1/4ha of land.
The Push-Pull farmer Kassa Belayhun in Chefa Dire village of Kemissie explains how the technology is protecting the crop “before the introduction of the technology this land was totally occupied by Striga. With the supports from the project, we planted the Desmodium and Bracharia last year to protect the Sorghums from the weed. At the moment, there is no weed at all in the demonstration plot, but you can see the flocks of the weed in several farms across the village. In addition, the performance of the crop on the demo site is very much better than the control farms.”

Mr. Ararsa, Plant Protection Head in Kemissie Zone. He shared farmer’s view applauding that PPT is the only available best solution for the devastating effect caused by Striga. He said, “Since livestock feeds and soil fertility problems are the high priority of the Kemissie zone, the technology responding well to these problems and implemented based on the interest of farmers, which is an excellent example of the positive impact of the technology.

4. MEETING WITH KEWOT DISTRICT AGRICULTURE BUREAU OFFICIALS

In the areas that the technology did not reached, the overwhelming effects of Striga is increasing more than ever before. The icipe team (Dr. Shifa Ballo, Desalegne Tadesse and Alayu Teshager) observed the situation on the ground and exchanged reflections with concerned officials in Kewot district.

The icipe team met with District head, Mr. Nigussie and his deputy. The meeting was commenced with explanation about the aim of the visit and reporting back what was seen in the field. Dr. Shifa stressed that despite the progresses made in the adoption of PPT, the invasion of the Striga has been increasing in the areas the project is not yet reached. The weed is not only affect crop but also killing the livestock feeds at the edge of the farms. These multifaceted effects happened on 12 villages out of 18 in the district due to little attention paid for mitigation mechanisms. Among other things addressing these challenges would require enhancing knowledge and skills on the technology at various levels, and strengthening coordination between the extension and agriculture bureaus in the project operating

“There is no doubt about the significant impacts of the technology in controlling the weed. We strongly appreciate the icipe for its commitment and outstanding achievements in this respect. We also know farmers are eager to adopt, but we failed to connect them with the technology. The district office took note the severity of the situation and thus will take the ownership to extend its commitment to promote the PPT initiatives,” said Nigussie
areas. Moreover, such information is essential for guiding policies aimed at achieving poverty reduction and food security at local and national levels. The team underlined, the crops and livelihoods are become increasingly endangered more than ever before. The clock is ticking, and when the management of agricultural system is not coherent, people continue suffering. To this end, the team urged concerned actors, to enhance their efforts in moving forward the fighting against the weed and the pest.

So, the discussion was all about looking ways to mobilize resources and efforts to halt the invasion of Striga in the district. It was also agreed to monitor & incentivize the model farmers to sustain the intervention.

5. MAJOR ACHIEVEMENTS

- In all the demonstration sites, the PPT convening to be named as the only innovative technology to save Maize and Sorghum from stem borers and Striga in Ethiopia.

- Both direct and indirect beneficiaries are increasing from time to time and the multiple benefits of the technology are very feasible.

- The initiative positively impacted crop productivity, improves soil fertility and livestock feeds.

- There are positive progresses made in Desmodium and Brachairia seeds and tillage production and distribution. Farmers started to produce seeds, which is added values of the project. The story of farmer Hassen Beyane from Wayu Wodesa village in Botter Tola district is a prime example of how this process can even mature into economic impacts. He grows the grasses and began generating income by selling 1500 birr, which has much better market value than major crop. This year he is expecting to get more yield. He said, “Through this technology I am planning to make astonishing history”. 
6. MAJOR CHALLENGES

- Climate changes effects are pausing challenges in some areas. Shewa Robit and Kemissie are the victims of climate change effects which affected by unconditionality and shortage of rain which have adverse effects on the plantation of Desmodium and Brachairia. Because of this reason, farmers and implementers forced to disseminate tillage (seedling) than seeds.

- Despite the positive moves in producing seeds in every FTC, there are also some mismanagements pulling back the progresses. For instance, in some areas the Desmodium removed from the plot and changed with other plant which is discouraging. This practice leads to the unsustainable adoption of the technology.

- The little attention paid by partners to scale out the technology to new areas.

- The limitations in production of seeds.

7. CONCLUSION

The recent farmers field day and research team visits dedicated to icipe’s innovative climate smart technology sites depict that the PPT remain the star attention heading towards the global and national food security and nutrition initiatives: improving agricultural production and productivity by protecting crops from pest and diseases. Observations from the field and deliberation from stakeholders’ discussion justifying this reasoning. That’s what icipe aspires to achieve with PPT, there is strong believe that the PPT comes at the right time to turn rhetoric into reality and commitment in to progress. Fortunately, this is seeking proactive state intervention in terms of aggressive economic policies to alleviate the problems.

icipe’s mandate further extends to conserving and utilising the rich insect biodiversity found in Africa. It contributes to sustainable food security through establishment of insect based enterprises, such as apiculture, that are sustainable, eco-friendly and synergistic, and that provide quick economic rewards to communities living in the forest areas. The underlying principle is to assist rural resource-poor communities to improve their livelihood, and to protect the natural environment, thus increasing the productivity and resilience of their farming systems and the natural resources, through uptake of these techniques.