



Strengthening Innovation and Technology Dissemination for Sustainable Development in Cereals, Cocoa and Coffee Value Chains in Western and Eastern Africa (SATIFFS)

Funded By:

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**Interim Project Progress Report for Uganda for the Period of
January – September 2014**

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**Gulu University
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**UNIVERSITÀ
DEGLI STUDI
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Background

The project: Strengthening Innovation and Technology Dissemination for Sustainable Development in Cereals, Cocoa and Coffee Value Chains in Western and Eastern Africa (SATIFFS), is a European Union funded project under the African, Caribbean and Pacific Group of States Science and Technology II Programme. The technical partners are the University of Molise and ARPA Molise in Italy. The Implementing partners are BioEconomy Africa (Ethiopia), University of Energy and Natural Resources, (Ghana) and Gulu University (Uganda). The overall goal of SATIFFS is “To Contribute to the Strengthening of Science, Technology and Innovation (STI) Capacities in the Agricultural Sector of Western and Eastern African Countries to Enable Food Security and Social Economic Development”. The project has the following specific objectives:

1. Establishment of working partnerships among the participating institutions.
2. Establishment of 3 Centres for Innovation and Technology dissemination (CITED) in each ACP partner Country.
3. Dissemination of successfully proven Appropriate Technologies (ATs).

The target group of the project are professors, researchers and post-graduate students of the African Universities involved in the project. Also the final beneficiaries are key stakeholders in maize, rice, cocoa and coffee sectors including farmers, farmers’ associations, traders, poor and disadvantage people living in rural areas of Ethiopia, Ghana and Uganda largely dependent on agriculture, wider farming community, users of research innovations.

The project duration is for 36 months, starting in January 2014 and ending in December 2016. During this reporting period, the following key activities were expected to be completed according the project:

- ✓ CITED created (by month 5);
- ✓ CITED management team and personnel contracted (by month 3);
- ✓ 12 hours of in-service training (by month 5);
- ✓ Office equipment, furniture and tools (by month 5);
- ✓ CITEDs Organizational charts (by month 3);
- ✓ Information system (by month 3);
- ✓ Baseline reports on the inventory of technologies produced (by month 6);
- ✓ Baseline reports published for each ACP partner (by month 10);
- ✓ Stakeholder meetings (one for each ACP partner) (by month 36);
- ✓ Field inspection in Uganda (by month 8);

WP1 “Project management”

The project started with planning and mobilisation from its commissioning in January. This included charting the way forward, setting up communication and reporting procedures. Gulu University was able to complete the Memorandum of Understanding with the University of Molise and sign the subsequent amendments during the first quarter. Also, the project account was opened during the same time. Dr. Martine Nyeko and Dr. Collins Okello represented Gulu University at the first Steering Committee at Compabasso Italy from 7th – 11th April 2014. This meeting was very successful and clarified a number of pending issues regarding the project implementation.

WP2 “Centres of Innovation and TEchnology Dissemination” (Leader: UGU)

Activity 2.1 Creation of CITEDs

Task 2.1.1 Recruitment of CITED management team and personnel

Achievement: Four CITED staff all from Gulu University were appointed to run CITED: The appointed staff includes

1. Dr. Martine Nyeko, Operational Unit Coordinator
2. Dr. Grace Okiror, Operational Unit Assistant
3. Dr. Collins Okello, Field Technology Person for the Gulu CITED
4. Ms. Grace Lawino, Project Administrator/Accountant

Task 2.1.2 Procurement of office equipment and tools (laboratory equipment, tools and furniture)

The first batch of analytical equipment was purchased by the technical partner and shipped to Gulu in late July. This batch comprised of ELISA KIT and Spectrophotometer. It has been processed by the clearing agent of Gulu University and is now awaiting payment and then it will be delivered to the University. Due to delays arising from shipping and clearing, the scheduled training of trainers’ session could not be completed. It was agreed at the steering committee meeting that this should be completed as soon as the equipment arrives.

The project faced some challenges from the beginning due to financial controls and regulations of the different project partners as they strived to conform their procedures to the regulations of the European Union. Eventually, this was sorted out and the first disbursement of project funds, amounting to one half of the first year’s allocation for Gulu University was received in mid-June. Nevertheless, these became actually available about one month later due to delays in the Bank clearance and communication. The following activities have been completed since then.

Activity 2.2 Implementation of the CITEDs

Task 2.2.1 Inventory of existing and potentially exploitable knowledge and technologies

This was a comprehensive exercise that involved a desk review, field study work and a stakeholders’ workshop. The report was written and submitted to the Technical Partner, University of Molise. The following were the main findings of the baseline study:

1. Identification of existing standards for rice and maize
2. Identification of assessment procedures and equipment for rice and maize
3. Identification of existing technology and technological gaps in the production of rice and maize in Northern Uganda
4. Identification of key technology attributes for selection and dissemination
5. Identification of key technological functions for selection

6. Prioritisation of key areas for technological intervention in rice and maize production
7. Development of recommendations for subsequent project activities

Task 2.2.2 Stakeholder workshops to carry out selection of potential technologies and innovations

The stakeholders' workshop was organised at Hotel Pearl Afrique in Gulu Town on 19th August 2014. A total of 28 persons attended and participated in the workshop (Figure). The planned program is attached in Appendix I. The objectives for the workshop were:

1. Consolidate on knowledge obtained from the field study work
2. Prioritize on the technologies for intervention
3. Identify participants for field visits and demonstrations

Presentations on SATIFFS background, objectives of the workshop and general quality requirements for rice and maize in the region were made. Members gave positive comments and reactions to these presentations.



Figure 2.1: Some of the workshop participants on the 19th August 2014

Stakeholder presentations and discussions

Mr. Kim Johansen, a representative from AFGRI, a private company dealing in bulk storage and sale of rice and maize in the three districts provided PowerPoint presentation on Grain Quality and Storage in Northern Uganda. He gave the background to the company and general quality issues affecting the grain

industry in Uganda at large. He stated that maize in the region has 40% post-harvest losses with only about 550 tonnes stored in proper facilities. The remaining ends up being sold as chicken feeds. The losses are more pronounced in first harvest season (July to August) due to difficulty in drying, while the quality of second harvest season (November to January) being better. The main maize grain quality problem is aflatoxins. He summarized by giving some of the initiatives that AFGRI has taken to improve the quality of grain in the region. This includes provision of training in the entire value chain, as well as technological infrastructure such as maize combines, transportation, drying and storage to ensure quality.

Mr. Moses Oryema, a representative of the World Food Program of United Nations (WFP), Gulu Field Officer, provided a verbal presentation on grain quality attainment at household level. He emphasized the need for quality as outlined by the previous speaker as a prerequisite for achieving good market prices. He also gave some initiatives that WFP is taking to promote production of high quality grain. These include provision of tarpaulins at household level for grain drying, as well as construction of grain Satellite Collection Points or Bulking centres at community level (sub county or parish level) to facilitate proper handling and storage. These centres are equipped with some technologies such as maize shellers, sorters and graders, moisture meters, weighing scales, and pallets; as well as some drying yards (about 10 m by 15 m concrete platforms). Both presentations were appreciated by the participants and stimulated meaningful discussions.

Dr. Grace Okiror, the Operational Unit Assistant, provided a PowerPoint presentation on the results of the field study work. He provided an overview of the quality aspects of rice and maize and existing standards. An overview of the production aspects in the project area, including acreage, use of inputs, production patterns, and technological challenges was provided. The participants provided more information that helped consolidate the report provided and accepted it to be factual and representative of the actual production situation in the project area.

Prioritisation of technological interventions

Dr. Collins Okello, the Field Technology Person of the SATIFFS Project, guided the discussion on the selection and prioritization of technologies for intervention by the project. He employed the Delphi Method (Hsu and Sandford, 2007) to complete help rank technology attributes, functions and production intervention phase. The first step was the select unique desired technology attributes and functions that each technology is expected perform. This was done during a plenary session in a participatory manner. The following technology attributes were identified by the participants:

- Adaptability
- Affordability
- Automation
- Durability
- Efficacy/efficiency
- Environmental friendliness

- Functionality
- Gender sensitivity
- Manual/power driven
- Multipurpose/multi-crop
- Portability
- Ready availability
- Safety
- Simplicity (operation/maintenance/construction)

Similarly, the following technology functions were selected:

- Bulk reduction (including sorting and grading)
- Cost saving/profitability
- Labour saving
- Product loss reduction
- Quality improvement
- Time saving

Following a consensus on technology attributes and functions, the workshop participants were randomly subdivided into four groups of at least six members each. Each group was tasked to deliberate and rank each set of the above attributes and functions. In the event that the group decided that certain attributes or functions were equally important, then an “average rank”, derived from the current and the next rank, was used. For example, if group members agreed that adaptability and affordability were equally ranking No. 1, then the rank assigned would be 1.5. Figure 1 describes results obtained by averaging the ranks for each attribute as assigned by all the four groups.

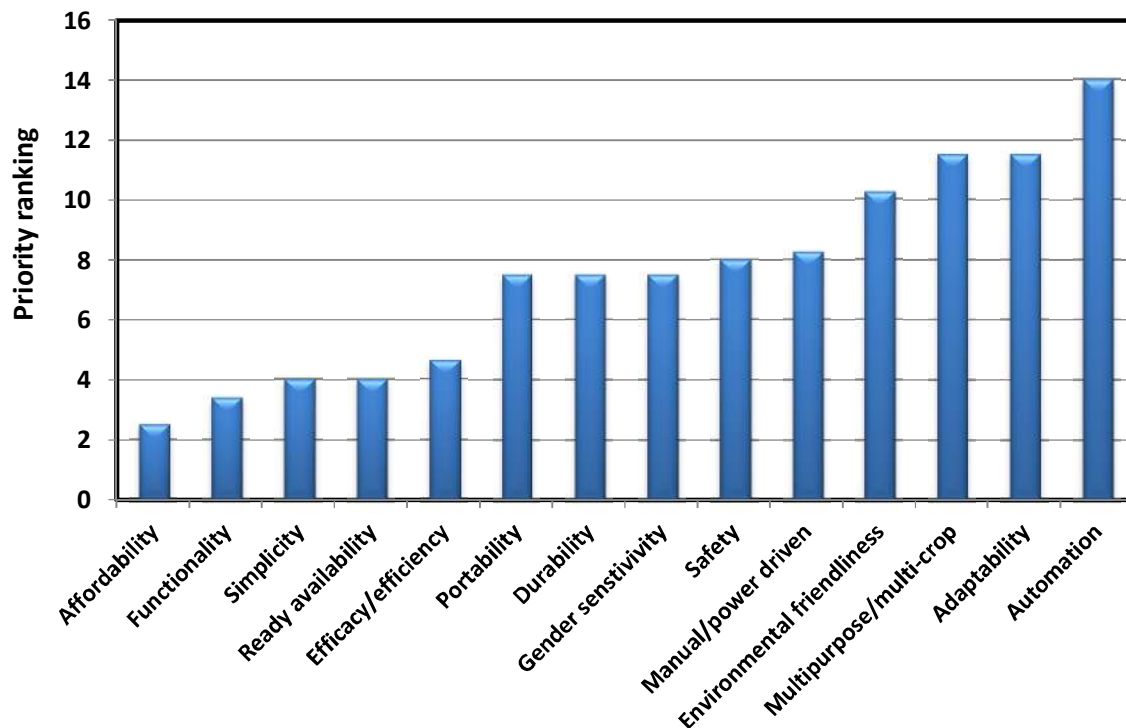


Figure 12. The averaged rank of the desired technology attributes (the lower the rank, the higher the priority to the stakeholders)

It is observed that affordability or the cost implication was the foremost attribute of importance selected by the stakeholders, while automation was of least significance. Nevertheless, Figure 8 shows that the attributes can be clustered into three major groups of importance: 1) affordability, functionality, simplicity, availability and efficacy would form a “technology design” category, which is of primary importance; 2) portability, durability, gender sensitivity, safety and manual operation would fall under the “performance attributes” category; 3) while environmental friendliness, adaptability, multipurpose usage and automation would be classified as “other attributes”. It is therefore important that the designs selected for dissemination should be optimised to suit the desires of the stakeholders in order to ensure quick adoption and multiplication by the community. Similarly, the functional requirements for the technology to be promoted were ranked as shown in the Figure 2.

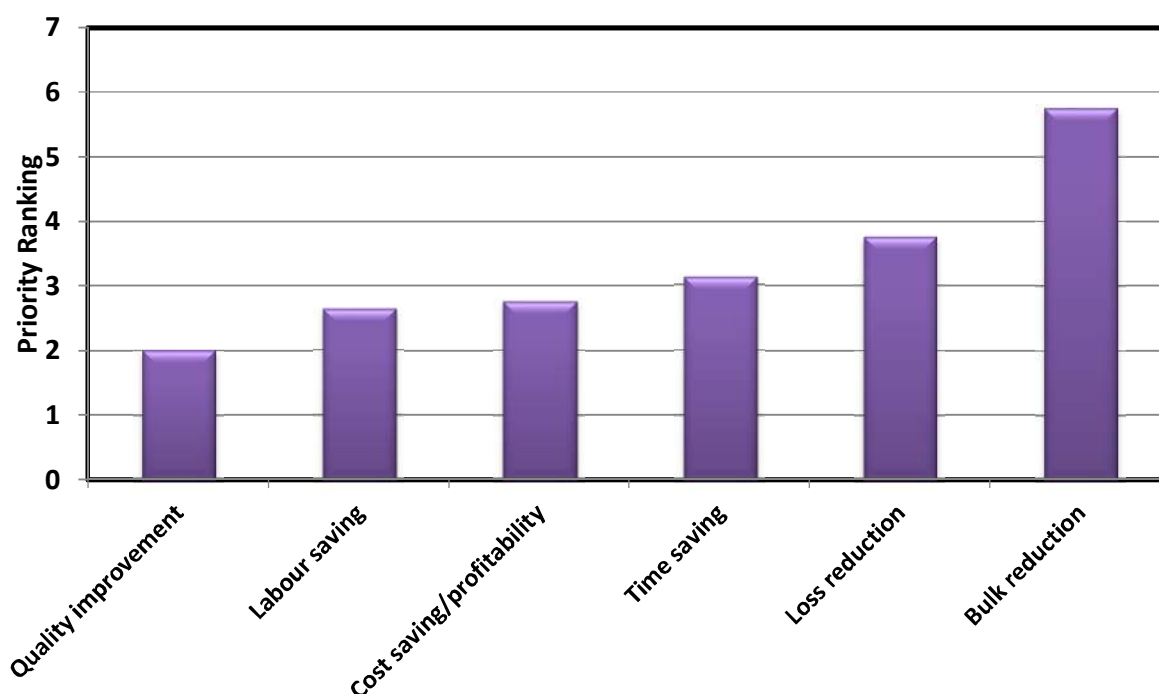


Figure 2.3: The averaged rank of the desired technology functions (the lower the rank, the higher the priority to the stakeholders)

It is also observed here that improvement in the quality of agricultural products was ranked highest by the stakeholders. This shows that farmers greatly understand the relationship between quality and price and so would like to have quality maintained or improved from their current practices.

After completing to rank technology attributes and functions, the stakeholders focussed on ranking the priority operations for technological intervention for rice and maize separately. Results of the rankings are given in Figure 3.

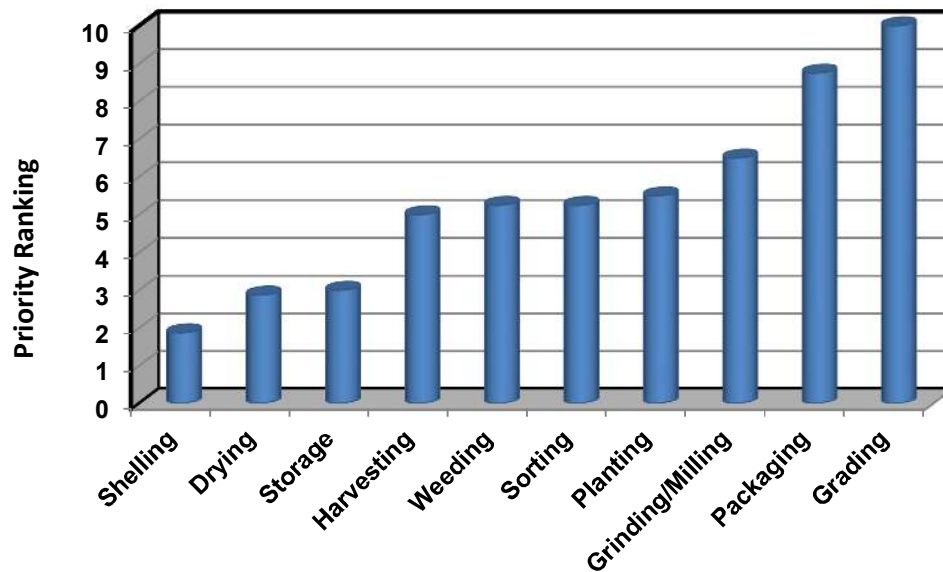


Figure 3: Ranking of priority operations for technological intervention for maize (the lower the rank, the higher the priority to the stakeholders)

It was observed that shelling is seen as the most important operation that should be improved in order to achieve desired quality. This is well in agreement with the findings of the field study, since most respondents reported that shelling is still done manually by most smallholder farmers. Drying and grading followed closely while packaging and grading ranked last. A similar plot for rice is shown in Figure 4.

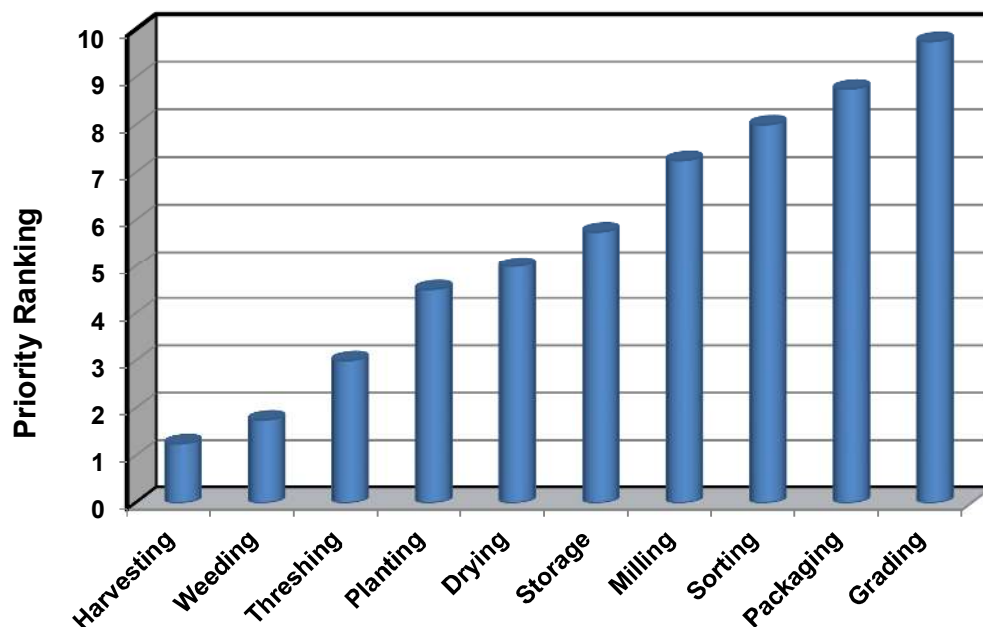


Figure 4: Ranking of priority operations for technological intervention for rice (the lower the rank, the higher the priority to the stakeholders)

For the rice value chain, it is observed that harvesting is the most urgent operation for technological intervention, closely followed by weeding and threshing. Though planting is ranked fourth overall due to its low labour requirement and availability of rudimentary methods of accomplishing the task as described previously, it is important to note that row planting is essential if weeding is to be mechanised. Therefore, appropriate planting technology automatically takes on the same rank as weeding technology. The next operation of importance to the stakeholders is drying, which is also a big challenge as described earlier. The operations of storage, milling, sorting, packaging and grading currently have some level of mechanisation at rice processing facilities and deemed adequate by the community.

Dissemination conference in Uganda

The first dissemination conference was held at Churchill Court Hotel in Gulu, Uganda on 9th September 2014. In total, there were 44 participants, six (6) were from Italy, 2 from Ghana, 2 from Ethiopia and 34 Ugandans from Gulu University, government extension agencies, NGOs, farmer groups, and the private sector dealing in agro-processing. The conference served to officially launch the SATTIFS project in Gulu, and to share important information amongst participating institutions and the general stakeholder community in Uganda. It was very successful and was highly appreciated by all stakeholders. A detailed report on the proceedings was submitted to the technical partner at the University of Molise.

Field inspections in Uganda

Following the dissemination conference, a team of 12 members of the steering committee participated in field inspections at Gulu and Nwoya districts in Uganda on the 10th of September 2014. Members visited a rice farmer in Nwoya who had established 50 acres of rice and owned rice and groundnuts processing facility. The farmer explained a brief history of the farm. He started cultivating two acres of rice, six years ago. Through investment in agriculture and rice milling, he has progressed to the extent having his own rice mill, groundnuts shelling machine, and a 50 acre crop. He explained that his main challenges are currently weeding, harvesting and threshing technologies. He expressed willingness to collaborate with the SATIFFS project technology testing and dissemination.



Some of the members of the steering committee inspecting a rice field

In the afternoon, the team visited NEGRI farm owned by the Catholic Diocese of Gulu. The farm has over two hundred acres of land, but currently cultivates only 100 on a regular basis due to labour limitations. The farm has three warehouses, a fixed grain dryer, a tractor, maize sheller and a rice mill. So the farm has adequate storage for the produce and sells it when the market is right. However, after ploughing, all subsequent operations, including planting, weeding, harvesting, and threshing are carried out by manual labour. The farm has a Memorandum of Understanding with Gulu University and will be available to participate in technology trials and dissemination.

Towards the close of the field inspections day, the team visited the facilities of Opit Investment Millers Limited is a local firm located in Gulu Municipality on Plot 14 Salvatory Olwoch Road in Cereleno Industrial Area of Gulu District. The firm specializes in milling rice and maize for farmers at a fee. It has three two-way rice milling machines and a complete set of maize milling machines to produce first class flour. The mill also has 1700 square metres warehouse available to the clients for storage of rice and maize for as long as necessary to achieve the desired market prices. The product storage and safety is provided free of charge to the members. The firm currently works with a total of 38 farmer groups, comprising 1,292 farmers in Gulu, Amuru, Nwoya and Pader Districts. The products are being sold locally and internationally to South Sudan and Rwanda. A separate report for field inspections was submitted to the University of Molise.

Conclusion

In summary, the stakeholders' workshop provided great insight into the technological needs of the maize and rice value chains in Northern Uganda, as well as the order of priority with which any interventions should be implemented. A quality assessment centre is crucial for monitoring the products available, both for public health and safety, as well as for appropriate commodity pricing. Specifically, technology for moisture content measurement, chemical and biological content determination, and laboratory grading is essential. For maize, it was concluded that shelling and drying emerged as the main operations for urgent technological intervention. For the rice value chain, key priorities are planting, weeding, harvesting and drying. It is also important that any technological intervention should be affordable, functional, simple to operate and readily available; and ensure improvement in product quality.

Way Forward

In order to establish a centre for innovation and technology dissemination (CITED) for rice and maize value chains in Northern Uganda under the objectives of this project, the following activities are envisioned.

Establishment of a quality assessment laboratory for cereals

The following equipment and tools will be required to facilitate quality assessment and monitoring.

- 1) Moisture meter - Measurement of moisture in the site or in the field for cereals, crop, cocoa, coffee. Automatic temperature compensation.
- 2) pH-meter - Measurement of pH in the site or in the field for cereals and crop
Features:
 - Measures pH value from 0 to 14 pH
 - Measuring resolution 0.01 pH
 - Portable and battery operated
 - Standardization Facility
 - Anti-Corrosive powder coated body
 - Easy plug in detachable sensor socket
- 3) Technical Balance: Weight: 2200 g - Div.: 0,1 g - Reproducibility: $\leq \pm 0,1$ g - Linearity: $\leq \pm 0,1$ g
- 4) Laboratory Oven - From 5° over room temperature until 300°C. Vol. 50 Litres. PID digital control. Stainless steel chamber with supports for the shelves completely removable
- 5) Kit ELISA (48 test for aflatoxins) No. 1 plate or strip colorimeter equipped with a 450 nm filter and related kits for testing the performance of the reader at 450 nm;
- 6) N. 1 Personal Computer with office software, for data processing;
- 7) Laboratory mill for cereals - for preparing samples to be analysed
- 8) Laboratory reagents and consumables - to perform the analysis outlined above
- 9) IRRI Rice Quality Assessment Kit
- 10) Laboratory rice polisher
- 11) Laboratory rice de-stoner

Appropriate technologies for testing and dissemination

Considering the stakeholders' needs and priorities, the following technologies are recommended for immediate testing and dissemination for both rice and maize value chains

Recommended technologies for testing and dissemination

Technology	Dissemination plan	After Sale Service	Accessories	Testing and Optimization
Manual rice planter(up to 70 cm width, 4 row planter, 8 kg seed hopper capacity, variable seed rate)	Field demonstrations, operations and maintenance manuals	Training of FTPs in operation and maintenance, Provision of service and parts limited warranty	Conventional tillage tools for seedbed preparation	Effect of operation speed on seed rate, Labour requirements, field efficiency, effect of soil pulverization on seed germination
Rice harvester (reaper: 1m working width, binder, 10-12 hp diesel, self-propelled, walk behind operation)	Field demonstrations, operations and maintenance manuals	Training of FTPs in operation and maintenance, Provision of service and parts limited warranty	Harvest storage bags if mini combine, windrow rakes and threshers/winnowers if basic reaper	Effective working width, effect of different row spacing, effect of forward speeds, throughput, reliability, damages, and fuel consumption
Portable motorized Rice Threshers	1. Training of TFP on use and maintenance 2. Train Artisans to use machines 3. Warranty on machines 4. Offering Technical advice	1. Complete toolkits with spanners 2. Welding plant 3. Welding rods 4. Measuring instruments	1. Manual translation into local languages 2. Training of FTP/Artisans/users of the machines 3. Field demonstration and optimization	The efficiency of the thresher (mechanical and output
Motorised Maize shellers	1. Training of TFP on use and maintenance 2. Train Artisans to use machines 3. Warranty on machines 4. Offering Technical advice	1. Complete toolkits with spanners 2. Welding plant 3. Welding rods 4. Measuring instruments	1. Manual translation into local languages 2. Training of FTP/Artisans/users of the machines 3. Field demonstration and optimization	The efficiency of the thresher (mechanical and output
Mechanical Dryer (Using rice husks, maize cobs, and other biomass. motorised blower and	Training FTP on Monitoring performance and maintenance of technology	Standard toolbox from manufacturer, Instruments e.g. moisture meter and temperature probes	Train farmers on how to install, operate and maintain	Monitoring the effect of temperature, humidity and moisture content on drying process

Technology	Dissemination plan	After Sale Service	Accessories	Testing and Optimization
portable)				