ISSD Tigray Partnership-*July 2019*

Cascaded Partnership Innovation Projects Heighten Early Generation Seed Production in Tigray Region

Introduction

The development of the Ethiopian economy heavily depends upon the speed with which agricultural growth is achieved. The rate of agricultural growth in Ethiopia in turn depends utilization of modern input and transforming the current subsistence oriented production system into a market oriented production system. Previous production increases were achieved largely by expanding new land into production, but this will no longer work because uncultivated land is no longer freely available. Productivity can be increased through improved and quality seed production and better management, but these benefits will not be realized unless substantial improvements are made in the overall seed value chain.

In Tigray region, shortage of sufficient amount of Early Generation Seed (EGS) is the major bottleneck in the seed sector. In order to solve this problem, ISSD has been supporting EGS supply for the last couple of years. For eaxample, during 2016-2018 EGS innovation projects on two orphan crops of the region were implemented. The projects for Dekoko and Finger Millet EGS multiplication and popularization were supported through its value chain component after the recommendation and approval of the regional seed core group. Different from the previous interventions, the projects were cascaded to TARI Agricultural Research Ceneters (ARC), in Alamata and Aksum for Dekoko and Finger Millet respectively. The following part describes the key achievements so far by the centers.

Improving Supply of Quality Seed through Multiplication, Popularization and Maintenance of Improved Dekoko Varieties: the Case of Southern Zone of Tigray

The production increment both in area coverage and productivity condition is almost none for locally pulse crop called Dekoko (*Pisum abyssinicum)* which is restricted to south Tigray areas. Dekoko is very similar to field pea in its morphological structure. Dekoko is consumed as a protein supplement in the cereal-based diets of Ethiopia. The crop is known for its high market price and for its unique food quality in its growing areas. Farmers and consumers call it "Dero-Wot of the poor" (chicken stew of the poor), in Amharic, probably to express its attractive taste and high nutritional value. In addition, it is source of income, rotational crop for cereal crops and animal feed in the growing areas of the region. Even though the highland area of southern Tigray is potential for dekoko production, its production and productivity is very low and local farmers are forced to produce the crop in very small plots of land. Less access to improved dekoko variety and susceptibility of the locally existing dekoko land races to diseases and insect pests becomes the most important constraints.

Cognizant of this, ISSD and TARI (Alamata ARC) has entered in to partnership to increase the production and productivity of dekoko crop through multiplication, maintenance and make easy access to farmers of improved and quality dekoko seed. Accessibility of quality seed of superior varieties is important to make it available and affordable to a larger number of farmers, thereby contributing to agriculture for food security and economic development of the Tigray region. To increase the seed access and contribute in the seed system, Alamata ARC got dekoko seed germplasm by collecting accessions from southern Tigray and North Wollo areas (local sources) and by then, the center had developed and released two dekoko varieties called Raya 1 and Raya 2.

Releasing new varieties by itself will not make contribution to the seed sector. The released technologies should be multiplied and available to seed users. In line to meet these objective, Alamata ARC has carried out different activities in 2017 and 2018 through MU-ISSD seed value chain grants. The activities include mainly early generation seed production, capacity building of seed producers cooperatives (SPCs), scaling up of the seed production in partnership with SPCs and Hadnet Raya seed union and establishment of formal seed system of dekoko crop. Alamata ARC has multiplied pre-basic seed class of Raya 1 and Raya 2 dekoko varieties by renting farmers' fields and using irrigation supplement at Mekhan (Enda Mekhoni wereda) and Hashenge (Ofla wereda) kebelles in 2017 and 2018. The center took good care and pay close attention at sowing time, during the growth stages in the field, at harvesting and threshing, and during seed cleaning and storage to have acceptable quality standards in terms of physical and genetic purity, germination and health status.

Even though any crop production follows normal agronomic practices that are required for growing a good crop, specialized activities were taken for the seed production of the dekoko varieties. Consequently, the basic seed were supplied to SPCs for further multiplication. Based on this, about 20 quintals was produced from the 1.75 ha of land in the off-season period of 2018. Moreover, the popularization activity was conducted in two kebelles of Tahtay-Haya in Enda-Mekhon; and Teke'a from Emba-Alaje weredas based on their production potential and willingness of the cooperatives for Dekoko crop production. The adjacent producing areas and interested participant farmers were selected in collaboration with development agents of the respective kebelles. For example, in 2018 main production season, seed of 14 quintals of two dekoko varieties (Raya 1 and Raya 2) were delivered to 52 interested farmers (10 female and 42 male) households.

Performance of dekoko plant at field condition and at harvesting stage at Hashenge kebelle

Most importantly, seed certification was made by seed certification agency of the Tigray region to ensure the purity, freedom from weed and other crop seeds and seed-borne diseases and good germinability.

Hence, the certification agency of the region gave an official letter to the center for its seed quality production. In addition, at the seed multiplication phase and at maturity stage of the crop, training and field day visit was organized to four SPCs which are members of Hadinet Raya Seed Union (Hiruyti Mekhan, Firyat Haya, Biruh Tesfa and Shewit Teke'a), DAs, district experts, zone development corridor expert, and re-

searchers involved in the improved seed production and quality seed control were participated at Hashenge kebelle in 2018.

After the training, basic seed of the two improved Dekoko varieties were delivered to 60 beneficiary farmers (30 in Teke'a kebelle of E/Alaje district and 30 farmers in T/Haya kebelle of E/Mekhoni district). The farmers in both kebelles have received both Raya 1 and Raya 2

Dekoko seed supplied and trained SPCs participants in Enda-Mekoni and Emba-Alaje weredas, 2018

Seed Supplied					Training Participants			
Wereda	Kebelle	Name of SPC	Quantity (Kg)	Area Covered (ha)	Participants	Composition		
						M	F	Total
Enda Mekhoni	T/Haya	Firyat Haya	700	7	Farmers	21	4	25
					Das	1	1	2
					Experts	0	1	1
Emba Alaje	Teke'a	Shewit Teke'a	700	7	Farmers	17	6	23
					Das	1	1	2
					Experts	3	0	3

On the other hand, training of full dekoko packages, including its input utilization and improved management practices was given to the improved seed producing cooperative member of Shewit Teke'a and Firyat Haya SPCs.

varieties in similar amount and planted in clustered areas.

Training participants at Ayba (Left) and Mekan (Right) kebelles

Lessons learnt in the project implementation

- Relevant knowledge of quality dekoko seed production system transferred to SPCs and the overall farming community. This has created an opportunity to formal dekoko seed production,
- Perception of farming communities in the importance of improved management practices for quality dekoko seed production was positively addressed and awareness created. Because, farmers were not using timely ploughing, weeding and fertilizer application for this crop and they use lands that has very poor soil fertility and marginal areas,
- Farmers appreciated the cluster based production approach in managing and producing quality seed and understood the market opportunities.

Finger Millet EGS Multiplication in Central Zone

Finger millet (*Eleusine coracana*), an African native probably originated in the highlands of Uganda and Ethiopia, is one of the few special crops that currently support the world's food supplies. It is an important crop in semiarid and tropical regions of the world due to its resistance to pests and diseases, short growing season, and productivity under drought conditions when major cereals cannot be relied on to provide sustainable yields. However, compared to the research lavished on tef, wheat, rice, and maize, finger millet is grossly neglected.

In Ethiopia, finger millet grows extensively in various regions of Ethiopia. It ranks sixth in production after tef, barley, wheat, maize and sorghum. However, its productivity is very low. This might be due to lack of improved varieties, low use of input and poor seed quality. The Tigray picture is not different from this. As a result, in order to improve finger millet productivity, research was conducted by regional finger millet coordinating center, Axum ARC. So far the center was able to release new improved variety called Mereb 1. Therefore, in partnership with MU-ISSD program, Axum ARC has initiated an innovation project on EGS supply of finger millet with the objectives; to multiply pre-basic seed of Mereb-1 finger millet variety in the central zone of Tigray and reduce shortage of quality finger millet seed in the region per the recommendation of regional seed core group in 2017.

The seed multiplication was carried out at Mereb-Leke wereda of the central Tigray. Mereb-1 variety was planted on 4 hectare of land at an isolation distance of 200-400m from other finger millet genotypes during the 2017 main production season. All other pre and post-planting management practices were done in accordance with the research recommendations for finger millet production.

With the budget share of MU-ISSD program and Axum ARC, 4 ha pre basic seed of finger millet variety Mereb -1 has been multiplied at Mereb-leke wereda tabia Hamedo. From the four hectares 24 quintal basic seed

Finger Millet: Basic Mereb-1 variety used as source for crowed sourcing activities in Asgede Tsimbila wereda

of Mereb-1 variety was harvested. The seed multiplication activity has been regulated two times based on the Ethiopian seed enterprise standard by the regional seed regulatory and evaluated by regional and center monitoring and evaluation teams. The regional seed regulatory, after field and laboratory inspection and testes, it approved its quality and use for the next production years 2018/2019 for further scaling out of the variety.

In addition, to create awareness on how to produce quality seed to the farming community, field day was organized for key stakeholders from wereda office of agriculture (experts and DAs) wereda administration office, wereda communication officials and beneficiary farmers from four kebelle administrations. A total of 60 participants attended the field day. And, overall intervention of the project has shown the potential of scaling up by establishing seed producer groups in to finger millet producing areas.

A Young Woman Who Transformed Stones into Fruits in the Lowlands of Tigray-Mereb Leke Wereda [Dawit Gebregziabher (PhD) Department of Agricultural and Resources Economics]

Personal Profile: Mrs. Haregu Gobezay is a young woman who lives in Merebleke district, in Central Zone of Tigray region. She is 40 years old. She is married and has six children, four females and 2 males. Haregu's educational background is grade 4. She is one of the Private Seed Producers who is linked with ISSD last year in the ISSD Tigray beneficiaries list. She is linked with biotechnology institute Mekelle by ISSD. As a result, she has got the opportunity for accessing ginger seed. Thus, she has diversified her business portfolio so as to maximize her current 67 million capital.

Haregu from where to where? Haregu, among other women farmer in Tigray engaged her livelihoods on small-scale agriculture and salary of her husband. Haregu, similar to the other females who live in the rural areas of Tigray, was confronted with a challenging life. The reason that her husband is employed and became the only source of income, and being the salary not enough to support the family, enable her to magnify her dependence greatly. This situation become worsened and challenged her to find other livelihood options that can enable her to support sustainable livelihoods for her family. One day she started to think that "this type of livelihood is from hand to mouth" and she

wanted to make paradigm shift on her livelihood and she started to list a number of livelihood options that she can engage with and finally something came to her mind, "Haregu? Can you see the degraded area over there? She replied, yes, yes! If you are able to work not only hard but systematically, the area will be productive for you." This has immediately changed her mind! But the idea that originated from her mind took her sometime to think if it is doable or not. However, the mind that initiated this noble idea also made another breakthrough. She has managed to clear the tremendous stones in the farm (she has hired a number of students to clear the stones for her in addition to her involvement in the stone clearing) and during the first few years she was able to engage on cash oriented vegetables such as tomato and she found out that the soil was not anymore fertile to support future agricultural productivity with the same or improved productivity even with the use of inorganic fertilizer.

Then, she came up with another novel idea that is strange not only for women famers like her but also for researchers like me and other established scientists. The noble ideas she come up with were 1) she has decided to replace the top soil by other fertile soil from somewhere else. Moreover, she also made a shift from vegetables to fruits like Mango (with Apple, Kent, Tommy, Kit, Dado, and local varieties), Avocado, Orange, and Mandarin and side by side she has also planted fodder grass like Desmodium, elephant grass and a tree called True neem (to be used as biological pesticide/ insecticide) and many others. The other breakthrough she did was that she has decided to ban use of any inorganic material, including fertilizer, pesticide, herbicide, insecticide and much more. The fruit tree farm uses cement canal invested with half a million birr investment and this helped her to get adequate water without leakage within a day for the 8 hectares of land. After this time, she has transformed her activities to Organic farm, now she has fulfilled the entire requirement that an organic farm can have according to the scientific literature.

Dairy farm: Haregu's organic farm also consists of dairy farm. Moreover, she also has small-scale biogas digester. This biogas uses fresh manure as an input from the dairy farm. The permanent employees use biogas to prepare their food and lighting services. These cows are feed with fodder grasses that are grown in her farm such as Desmodium, elephant grass, Rodes grass, and alfalfa.

Haregu's seedlings of fruit trees

Investment on the improvement of soil ecosystem: In addition to the replacement of top soil with the other fertile soil from other place, she has also performed a number of activities to enhance the health of the soil or to combat the soil related problem that are common in the area. These include soil salinity, rocky landscape, Striga infestation and low organic matter. To address these problems she currently has 53 compost big pits and 13 Vermin compost and the compost is applied to fruit trees. Compost produced from these pits will be applied to the farm and it greatly improves the productivity and health of the fruit trees. Moreover, she also owns two pits for bio-slurry and this is mainly applied to plants that are deficient with nutrient and that become yellowish color. It was proven to change the color of the plants from yellowish to deep green in two weeks. She is also reclaiming the gully using soil bank, that is she use contour part of the gully at the top she uses filter that is used to trap other materials that is not top soil and the top fertile soil enter to the contoured gull and it fills it and after sometime it will be used for planting fruits such as papaya.

Biological control for diseases and pests: After she

ban using inorganic materials including pesticide and insecticide, she has developed her own method to develop biological pesticide or insecticide. She started to use leaves of true neem trees and she mixed this leaves with Urine of oxen. The mixture will be fermented for 15 days after that the liquid could be applied as an Integrated Pest Management (IPM). Moreover, the leaves of Desmodium are also used for similar purposes. Desmodium was introduced in 1996 through as livestock feed by Relief Society of Tigray (REST), however, Haregu was able to use this grass to eliminate Striga and she has presented about this in a conference and she remained to be known for using desmodium as feed, seed, IPM and more.

Job creation opportunity of the farm: since the time she started farming she has employed a number of individuals, especially those who school dropouts, those who are affected by poverty. When hiring she is targeting these two segments of the society. Unlike the other farm owners, Haregu, did not want to have an employee to stay with her for his/her lifetime rather she wanted them to have future plan to get out of poverty. As a result, she has contributed towards reduction of school dropouts and poverty in the area. She also told them either to help their family, to save from what they got and to develop their own farm in the future. She gives especially support for females to establish their own farm, for this reason females who want to be hired on her farm is not only for getting money but also for their own future development plan. She is using working schedules that are not common in developing countries, she hires students on shift or hourly basis and this has helped the students a lot to get income without missing their classes. As a result, many of the students who were working in her farm are now able to complete their high school and some of them became Univesity lecturers in the Ethiopian Universities. She is also a source of seed and seedlings for the workers who wanted to establish their own agricultural farm and beyond. She is distributing seedling of fruit trees with affordable prices to different stakeholders in the region.

Contribution of the farm to Sustainable Development Goals (SDGs): The farm also greatly contributes to a number of Sustainable Development Goals such as to SDG 4 which deals with fostering Education through creating job opportunities (along the value chain) for the students who are not able to continue their education because of the shortage of income for their survival. Moreover, the area was severely degraded area but now it becomes green and totally rehabilitated and this contributes to the SDG 15 that deals to protect, restore and promote use of ecosystems through reversing land degradation and halt biodiversity loss. Her work has also greatly contributed towards SDG 2, which is end hunger, achieves food security and improved nutrition and promotes sustainable agriculture. Moreover, her work also contributes to ensure healthy lives and promote the wellbeing for all at all ages, because the produce is organic and it is proven that organic agricultural produce have more contribution towards ensuring healthy of lives. She is also motivated to achieve gender equality and empower all women and girls. She considers gender equality when hiring labor and she in turn contributes for the gender equality thinking in the areas. As one component of the organic farming, she also has dairy farm and this contributes towards employment creation and thereby economic growth (SDG 8). Moreover, she is also using the manure as an input for biogas, using biogas contributes towards two SGDs, one is SDG 13, which is take urgent action to combat climate change and its impacts, this is done through reduction of Methane from the atmosphere (that could be emanated from the fresh dung), the second is the biogas will contribute to achieve the SDG 7, by "ensuring access to affordable, reliable and sustainable and modern energy for all."

In summary, the work that Haregu is engage with contributes not only for development of land uses through rehabilitation of degraded area thereby improve the natural capital, this contributes to secure the livelihoods of Haregu and many others, who are involved along the value chain in one way or the other. Furthermore, the

The Integrated Seed Sector Development Project (ISSD Ethiopia) is one of the proud projects under the BENEFIT partnership.

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practice also contributes to enhance the ecosystem services and combating the climate change impacts. Moreover, her engagement has a range of SDGs such as SDG 4 which deals with fostering Education through creating job opportunities; the SDG 15 that deals to protect, restore and promote use of ecosystems through reversing land degradation and halt biodiversity loss; SDG 2, which is end hunger, achieve food security and improved nutrition and promote sustainable agriculture; dairy farm and thousands of fruits contributes toward employment creation and thereby economic growth (SDG 8); using manure from her dairy as an input for dairy cow contributes for two sustainable development goals i) SDG 13, which is take urgent action to combat climate change and its impacts through reduction of Methane from the atmosphere and ii) biogas will contribute to achieve the SDG 7, by "ensuring access to affordable, reliable and sustainable and modern energy for all."

Existing challenges of this organic farm

Even though there is much produce of fruits it is not possible to engage value chain actors, because the fruits as sold as raw. Therefore, conducive environment should be created to add value of these fruits through agro-processing industries. Moreover, stakeholders in this type of activities should engage on facilitating certification of the organic produce. Moreover, value chain should be established to engage stakeholders as producers, processors, suppliers, distributors (whole sellers and retailers), and consumers with fair price.

Some of the Activities of ISSD Tigray Unit in a Pictorial Glance





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ISSD Ethiopia aims to improve female and male smallholder farmer access to quality seed of new, improved and/or farmer preferred varieties sustainably increase agricultural productivity.

Using an Integrated Seed Sector Development approach, ISSD Ethiopia promotes a vibrant, pluralistic and market oriented seed sector. ISSD Ethiopia works through teams based at Haramaya University, Bahir Dar University, Mekelle University, Hawassa University and the Oromia Seed Enterprise. ISSD Ethiopia is part of the BENEFIT partnership the Project Management Unit is hosted in the BENEFIT office.

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