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Impact of Boloso-1 Taro Production on Livelihood Security of Farming Communities in Kindo Koyisha and Duguna Fango Woredas, Wolaita Zone

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Keywords: *bolos 1 taro, food crop, livelihood, productive.*

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Keywords: *bolos 1 taro, food crop, livelihood, productive.*

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I. Introduction

a) Background and justification

In Southern Ethiopia, root and tuber crops are one of the traditional food crops. As they are alternatives to cereals, their contribution to food-self-sufficiency, income generation and soil based resource conservation is indispensable. Among those root and tuber crops grown in Ethiopia, enset, potato, sweet potato, taro and cassava are the principal crops (Yared, 2014; Tewdros, 2013).

Taro is a highly prized and dominant staple food in the subsistent sectors; and an important source of cash income when marketed locally. Unlike other root crops, taro performs well under water logged conditions and can stay for prolonged period of time after harvest without damage. Because of this nature of the commodity, its production is becoming massive and has been contributing a lot for areas under chronic food insecurity (Yared and Tewdros .,2014;African Bioscience Challenge Fund, 2012).

The most important feature of taro is its good adaptability, resistant to different diseases and produce high amount of yields in different areas especially on tropical environments (Tewodros, 2013). The consumption of both taro and sweet potato is threefold:

human food, animal feed and the production of alcohol and starch. Yared. D and Tewdros. M. 2014).

Seasonal food shortage is amongst the principal problems of farmers in mid-altitude areas of Southern Ethiopia. Taro is important part of food security packages. Globally, taro is grown over a wide range of environments from 1,300-2,300m.a.s.l.; mostly by the resource poor farmers. Its compatibility with various types of limited input farming systems (versatility) and reliability under conditions such as drought, high rain fall, and low soil fertility have made it attractive crop to farmers (Yared.et.al, 2014).

To overview the level of introduction and adoption of taro technology, to analyze its economic, livelihood and nutritional and food security role for farming community, identify opportunities and challenges, it is indispensable to carryout and follows the multi-sectoral institutions approach to implement this research. Therefore, this study is planned to undertake investigation on impacts of improved taro variety on food and nutritional security in Kindo Koyesha and Duguna Fango woredas of Wolaita zone.

b) Rationale of the assignment

i. *Provision of Improved Taro Boloso-1variety – new technology*

The project entitled 'creating resilience through integrated multi-sectorial approach in emergency prone areas of Wolaita Zone' has been implementing in Kindo Koysha and Duguna Fango woredas of Wolaita Zone in collaboration with small-holder farmers, GOs and other stakeholders since 2012. The principal objective of this project was to contribute to the improvement in nutritional status of vulnerable households in Wolaita zone through building their resilience to future shocks. Among the different tasks of the intervention in the district, enhancing nutritional and food security of target households was one of the major aims of the project. As part of the planned activity in this sector, Concern worldwide distributed improved Taro Boloso-1 variety seed to target households.

Taro production has been covering large proportion of the area at the target Woreda. But its impact on household's livelihood, its production constraints and opportunities were not studied documented and well documented. Therefore, Concern Worldwide in partnership with Areka Agriculture Research Centre planned to conduct this study on the impact of taro on target households. This study aimed to assess contribution of taro production and marketing on the project's targeted household's livelihoodn in Kindo Koysha and Duguna Fango woredas of Wolaita zone. It is also planned to develop strong evidence-base in-depth information on the seeds contribution in food and nutrition security of target households. In addition, synthesizing knowledge and lessons learned as a base to scale up these interventions and use as a guide for future programming was also another goal of the study.

c) Objectives

General Objective

- The overall objective of this study was to conduct impact assessment of taro dissemination on food and nutrition security of project's target HHs.

Specific objective

- To assess factors affecting productivity of Improved taro
- To examine impact of improved taro variety production in food and nutritional security of targeted households.

II. Methodology

a) Site description

The Wolaita zone is one of the thirteen zones of the Southern region of Ethiopia covering an area of 4471.3 km2. For administrative purpose it is divided in to twelve woredas (districts) namely; Boloso Bombe, Boloso Sore, Damot Gale, Damot Weydie, Damot Pulasa, Damot Sore, Diguna Fango, Humbo, Kindo Koysha, Kindo Didaye, Offa and Sodo Zuria. The study was carried out in two Woreda namely Duguna Fango ad kindo Kosha(CSA,2014).

In southern Ethiopia, the root crop area coverage meher cropping season was more than 90,000ha in 2014 and its productivity per ha of land estimated to be more than 302 quintal, which was higher than other food crops in the country. Root crop coverage of Wolaita zone was more than 32 000 ha and its productivity estimated to be greater than 336 quintal/ha, which was higher than the region average (CSA, 2014.)

Data Collection and sampling techniques

The two main data collection techniques used were focus group discussion (FGD) and formal survey techniques. FGD process was guided by checklist that was drafted by the researchers and commented by Concern officials and experts for improvement. For FGD, farmers, youth, women, kebele leaders and DAs were selected purposively representing different age and gender groups based on the involvement of individuals in the process of Taro seed dissemination and utilization. The major challenges of production and productivity of root crops comprised of untimely and inadequate seed distribution for farming communities, erratic rain fall, lack of scientific information on impact of improved taro variety and its role in food and national security of beneficiary farmers. Hence, the investigation on role of Boloso 1 Taro variety in food and nutritional security believe help a lot in generation scientific and timely information, characterize the opportunity and challenges of taro production and identify determinants of productivity of the crop.

Total of four FGD were carried out in two kebeles per each woreda partaking 15 individuals per FGD in average at the beginning of the study.

Information gathered during FGD created the basic map of the intervention and helped to verify the data collected with survey. It also helped as important resource to develop structured questionnaire for formal survey.

Nine experienced enumerators were hired and trained in administering the structured questionnaire for two days. Filled questionnaires were also examined by the researchers and appropriate comments were forwarded to enumerators for better quality of collected data on the first days of survey.

The formal survey was carried out on 180 beneficiaries with the help of trained enumerators. The approach by Kothari (2004) was employed to determine appropriate sampling size of taro beneficiaries for the study: n=z2pq/d2: Where n = the sample size z = 1.96, P = Population proportion (the proportion of taro producer in Kindo Koisha and Duguna Fango. d = the significance level set at 95% confidence level. This corresponds with a z value of 1.96. q = is a weighting variable computed as 1-P.

Primary data was collected by focusing on overall impacts of the Taro technology intervention through evaluating socioeconomic characteristics of beneficiaries, contribution of taro on their livelihood in terms of income, food security and market stability, volume of production per farmland with taro and other major crops (maize, cassava, sweet potato, sorghum, potato and teff).Before and after intervention bases. The impact is also evaluated on bridging food gaps in different months, nutritional security and food diversification in household, perceptions of beneficiaries on what has been done, success stories, opportunities and constraints of utilizing taro were collected from farmers, traders and other participants involved in production and marketing of taro. Role of other actors including development agents, community workers, agricultural officers and project implementers and supervisors were also assessed to differentiate cumulative and individual (Concern Worldwide) contributions in the study area.

Information from secondary sources such as Areka Agricultural Research Center (AARC), Concern-Worldwide (ECHO I end line survey report, Assessment reports, PPDM reports, annual reports, proposal and DIP), Central Statistical Authority (CSA), Wolaita zone and both woreda agricultural offices is also utilized as a complement and reference for our study. All monitoring data from concern worldwide which is collected since the beginning of the project, annual action plans and reports, quarter progress reports, baseline and end line survey reports, assessment reports, project proposal, log frame and M&E plan were reviewed.

b) Data Analysis

Descriptive statistical analysis was used to define mean, mode, percentage and standard deviation of important economic variables considered in collecting information. In addition to descriptive analysis method, econometric analysis was employed to identify factors affecting productivity and contribution of improved taro variety for livelihood of farming community. Linear Regression Model was employed to analyze the econometric relationship between explanatory and dependant economic variables.

III. Results and Discussion

Table 1 : School drop outs, migrations before and after the intervention

Years of technology intervention	2003/4EC		2006/7EC	
Statistical variable	Mean	Std. Dev.	Mean	Std. Dev.
Age of the respondent, in years	42.75	9.80		
Male No. of school drop outs < 15 years	.15	.46	0.07	.34
Male No. of school drop outs 15 to 65 years	.25	.54	.07	.34
Male No. migrated < 15 years	.04	.19	.02	.18
Male No. migrated 15 to 65 years	.17	.42	.07	.34
Female-No. of school drop outs < 15 years	.06	.22	.01	.09
Female No. of school drop outs 15 to 65 years	.19	.48	.02	.14
Female-No. migrated < 15 years	.03	.17	.01	.08
Female-No. migrated 15 to 65 years	.11	.33	.02	.13

The average age of framers in the study district was 43 and the age of respondents to other farmers varies in 10 year. The result shows that there is a big difference on the rate of school drop outs and migration between 2011 and 2014. 26% of male students aged 15-65 left their study before the end of academic year in 2011 but it slides down to only 9% in 2014. It dropped from 14% to 2% in the case of female students at the same age range. When the farming communities able to secure food security, they engage their children fully in education and the study results confirmed this. The main reason for declining of drop outs for both male and female are improvement in food security and infrastructural development. In comparison to males, the extent of decline in drop outs in females is higher than that of males. This is because of opening of new education centers at the vicinity of communities and other infrastructural development. Introduction of

productive variety of taro contributed a lot in facilitating the education process through assuring food security. When the migration level is examined, it descended from 17% to 8% for 15-65 age male and 11% to 2% for women. The major causes of migration listed by farming communities are food insecurity, lack of income and search of jobs. When the farming communities are able to secure food at household level, their level of participation in agriculture actively improved and, consequently, their probability to migrate from place to place decline immediately equipments from 2011 to 2014.

Table 2 : Farm and communication tools ownership before and after the intervention

Years of technology intervention	2003/4EC		2006/7EC	
Statistical variable	Mean	Std. Dev.	Mean	Std. Dev.
Radio-No. Owned	.05	.22	.24	.43
Tape recorder-No. owned	.06	.33	.05	.21
Phone (mobile)-No. owned	.04	.20	.31	.49
Hoe No. owned in	1.08	.63	1.49	.98
Spade-No. owned in	.42	.58	.70	.69
Ox plough (set)-No. owned	.71	.73	.84	.73
Sickle-No. owned	1.16	1.20	1.58	1.43
Animal cart No. owned	.00	.00	.05	.29

The result in above table indicates that improved taro beneficiaries have got improvement in access and utilization to communication tools and farm implements when compared to the base year (2003/4EC) in 2006/7EC. Since the interview beneficiary farmers are poor in wealth status at the intervention period, the improvement in agricultural and communication tool was the outcome of dissemination of improved Taro variety to the farmers. This study result indicates that dissemination of improved taro variety made the targeted farmers to develop more farm and communication tools and, consequently ownership of this equipments played a positive role in improvement in food and nutritional security.

Table 3 : Roofing materials of beneficiary houses before and after the intervention

Woreda	Keble	Roofing material of the main house in 2003/4EC(2011)			Roofing material of the main house in 2006/7EC (2014)		
		Grass	Iron sheet	Total	Grass	Iron sheet	Total
Kindo Koysha	Bade Woyde	43	7	50	22	29	51
	Fechena	39	10	49	16	33	49
Duguna Fango	Fango Humbo	38	6	44	26	18	44
	Dendo Offa	26	1	27	14	12	10
Total		146	23	170	78	92	170

It is concluded that the roofing material used in housing can be evidence for the income and livelihood status of a household in the study areas. Only 13.5% of the beneficiaries had a roofing material of iron sheet before the multi-sectoral resilience building project intervention in which provision of improved Taro was one of the activities. It moved up to 54.11% in 2014.

Impact of Improved Taro Dissemination in ownership of Livestock

The result shows that the rate of ownership for all oxen, cow, heifers, calves, sheep, goats, poultry, bee hives and donkey has boosted after the intervention in study Woreda. Different ownership rates are seen among small and large ruminants. For instance, goats were owned by only 18% of the respondents in 2011 but now around 75% of the respondents have at least one goat. This can be explained by the fact that goats are tough animals which can survive drought challenges and land shortage for grazing through browsing leafy plants that are not preferred by other animals. In the other hand, even if the enhancement rate of oxen and cow ownership is below that of goat, it has been improved from 19% and 61% to 42% and 91%, respectively. Oxen are used mainly as a ploughing of the farms. Improvement of cow ownership is a good ownership is a great opportunity for a family to have milk in a dish that diversifies their food sources. Moreover, availability of milk in a dish means a better nutritional security in household.

Table 4 : Livestock ownership of farmers in two various years

	2014		2011	
	Mean	Std. Dev.	Mean	Std. Dev.
Oxen-No. owned	0.42	0.60	0.19	0.43
Oxen-shared	0.20	0.42	0.11	0.36
Cow No. owned	0.91	0.66	0.61	0.68
Cow shared	0.55	0.67	0.24	0.47
Heifers -No. owned	0.28	0.49	0.06	0.23
Heifers –shared	0.10	0.34	0.02	0.14
Calves -No. owned	0.28	0.48	0.03	0.21
Calves -shared	0.21	0.44	0.01	0.12
Sheep -No. owned	0.49	0.79	0.13	0.50
Sheep –shared	0.20	0.55	0.01	0.17
Goats-No. owned	0.75	1.09	0.18	0.64
Goats-shared	0.21	0.55	0.06	0.35
Poultry -No. Owned	0.67	1.59	0.06	0.23
Poultry –shared	0.14	0.62	0.01	0.12
Bees hive -No. owned	0.03	0.24	0.00	0.00
Donkey -No. owned	0.17	0.39	0.01	0.08

The yield of local taro is 2 qt per timad in average but 7 qt yield can be harvested from Boloso-1-taro variety in farmer's field condition. Even if this result is far below the documented potential of improved taro, it still surpasses the local variety by 250% or above three fold. The local taro was consumed continuously for a maximum of 2 months as a sole crop but the improved variety can be used for up to 5 months.

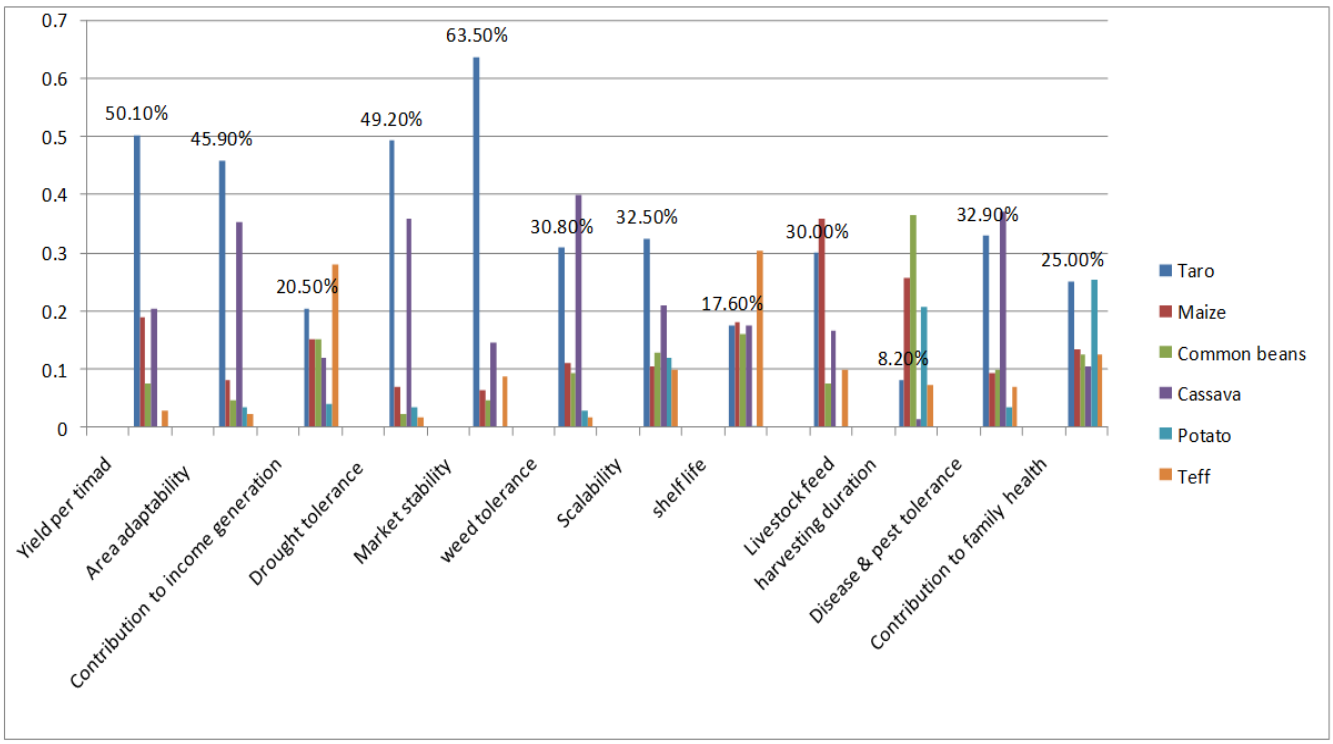
Table 5 : Taro Variety, production and Market pattern

	Local Taro Variety production and Market pattern				Boloso 1 Taro variety Production and Marketing pattern			
	Minimum	Maximum	Mean	Std. Dev.	Minimum	Maximum	Mean	Std. Dev.
Land Area (Timad) in 2006/07	0.00	1.00	0.06	0.16	0.10	3.00	0.64	0.53
Yield (qt) in 2006/07	0.00	50.00	2.07	9.32	0.50	50.00	6.86	8.17
Consumed (qt) in 2006/07	0.00	50.00	3.74	12.9	0.00	50.00	4.05	7.17
Sold (qt) in 2006/07	0.00	1.00	0.02	0.15	0.00	180.0	3.02	16.14
No. of months the crop consumed 2006/07	0.00	8.00	0.57	1.45	0.00	12.00	4.68	2.41
Quantity Used as a seed (qt) 2003/4	0.00	20.00	0.47	2.46	0.00			
Land Area (Timad) in 2003/4	0.00	25.00	0.63	2.51	0.00			
Yield (qt) in 2003/04	0.00	50.00	3.65	9.66	0.00			
Consumed (qt) in 2003/4	0.00	40.00	2.15	4.96	0.00			
Taro local-Sold (qt) in 2003/4	0.00	5.00	0.48	0.81	0.00			
Taro local-No. of months the crop consumed	0.00	12.00	1.88	2.31	0.00			
Taro local-Used as a seed (qt) 2003/4	0.00	50.00	0.99	5.01	0.00			

Table 6 : Role of Gender in Taro production and marketing

Activities	Gender	N	Percentage
Planting, Earth up and weeding	Husband	130	76.5%
	Wife	15	8.8%
	Son	16	9.4%
	Daughter	9	5.3%
Harvesting	Husband	117	70.1%
	Wife	22	13.2%
	Son	20	12.0%
	Daughter	8	4.8%
Feeding the livestock	Husband	46	27.9%
	Wife	81	49.1%
	Son	30	18.2%
	Daughter	8	4.8%
Marketing of taro	Husband	7	4.4%
	Wife	135	84.9%
	Son	3	1.9%
	Daughter	14	8.8%

The study revealed that due to an introduction of Boloso-1, an improved taro variety, women have got access to get cash from the crop. According to the survey, 84.9% and 8.8% of the respondents responded that surplus taro products from the total production in the household were marketed by wife and daughter. This implies that, in the study area, taro production has empowered women by enabling them by diversifying their cash source. But the majority of the production activities were covered by male. According to this study planting, earth up, weeding and harvesting activities of taro production were covered by male, but marketing of taro product and feeding livestock by taro feed were undertaken by women(see the above table). In general, in the study area, taro production and marketing has contributed a lot to women through empowerment by marketing and to earn income better than other crops.



The major crops namely maize, common beans, cassava, potato and taro are compared by respondents for different parameters indicated in the above figure. The criteria were yield per ha, adaptability to their agro-ecology, income generating ability, drought tolerance, market stability, weed tolerance, scalability, shelf life, livestock feed, harvesting duration, and disease and pest tolerance. According to the study, taro is ranked first by most parameters such as yield per ha, adaptability to different areas, drought tolerance, market stability, scalability, disease and pest tolerance and contribution to family health. The harvesting duration of Taro is longer than most major crops except cassava. The relative advantage of producing taro on stabilizing the market has been mentioned by 63.5% of the total respondents.

Farmer's General Perception on Taro

The study revealed that Boloso-1, an improved taro variety, has contributed more to crop productivity improvement, increased farm income, reduced migration, generate employment opportunities and improvement in nutritions at household level, but majority of the respondents responded that they are indifferent about the contribution of taro to women empowerement. Accordingly, the graph below shows the general perception of the respondents on the contribution of the taro for livelihood improvement in the study area hence majority of the respondents were strongly agreed that Boloso-1 has contributed to poverty reduction at household level. But some of the respondents were responded that they don't know about contribution of taro to poverty reduction.

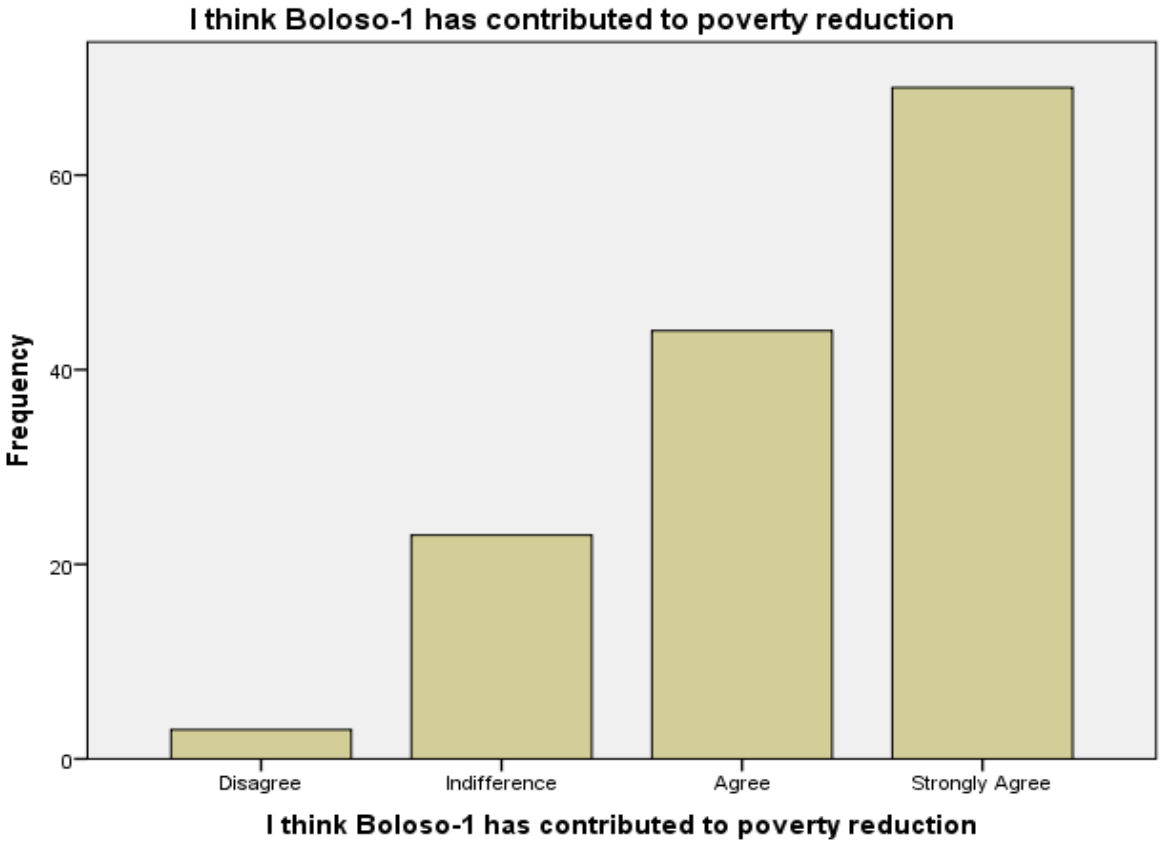


Fig. Graphical presentation of farmers' perception on contribution of taro for poverty reduction

This study revealed that most of the taro producers have knowledge about the contribution of taro to living standard improvement at household level in the study area. According to the survey undertaken more than 60% of the respondents responded that they were strongly agreed with the contribution of taro to improvements in living standards of the community in the study area.

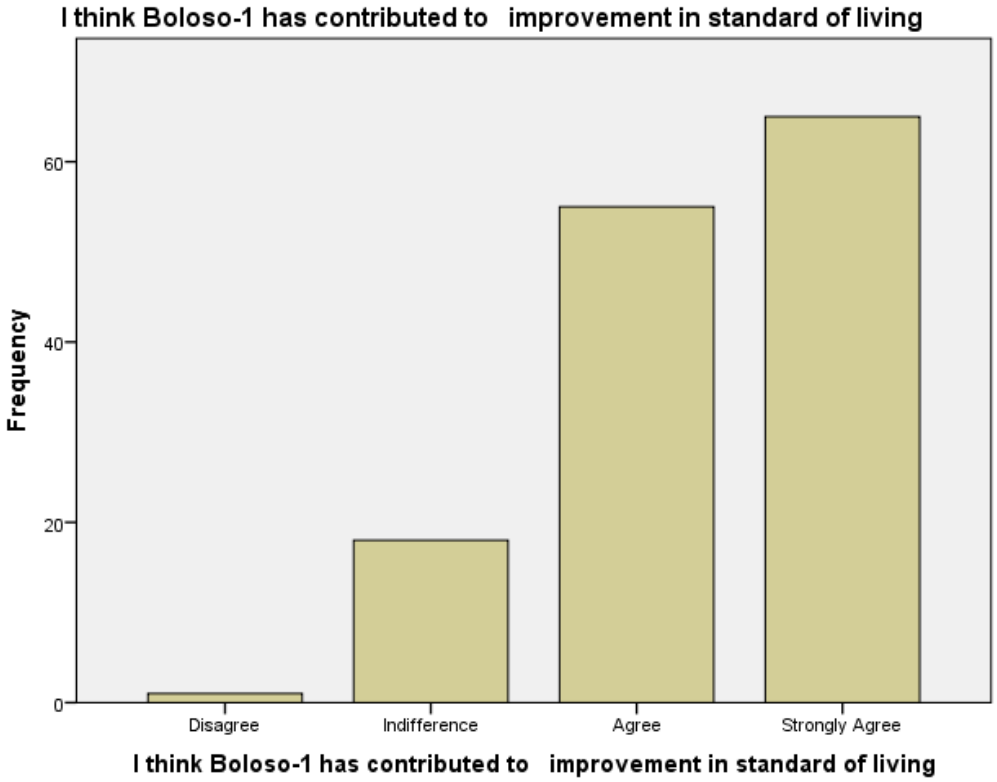


Fig. Graphical presentation of farmers' perception on contribution of taro to living standard improvements

According to the study, because of the introduction of Boloso-1, an improved taro variety, in the study area the average nutrition level was increased at household level as the have got access to incorporate taro food items their family's daily meal. As the study revealed majority of the respondents strongly agreed that their households' average nutrition level is increased due to taro introduction.

Success stories

Ato Moges Mota is one of Concern worldwide beneficiaries in Damot Shinka Kebele of Duguna Fango Woreda. He took 2 quintals of taro seed from Concern worldwide in March 2013. He planted it on quarter hectares of land and harvested 10 quintals of taro product. He sold six qt, used two qt for home consumption and two qt saved as a seed. By using money from selling taro, he bought a donkey, which is very important animal commonly used to transport his agricultural inputs to his farm and farm products to markets at woreda center and nearby kebeles. Then, he planted his taro seed in the same farm in 2014 and got 500 birr by selling some part of taro product. He bought sheep and started rearing it. This diversified his farm as additional livestock component and contributed to building household asset. Sheep is raised mainly to be sold as income source during public festivals and it can also be consumed in home for holidays or slaughtered as additional food for mothers when they deliver a baby. Similar stories are common in both project woredas.

W/ro Almaz Meskele is also a farmer and a woman household head in Duguna Damot Shinka Kebele of Duguna Fango Woreda. She was not able to feed and educate her children due to her low economic status; therefore, two of her sons were migrated to Bitena and Wolaita Soddo towns to look for better life. After receiving the same amount of Taro seed in 2013, she collected eight quintals. Then, she sold four, consumed two and kept two qt as a seed. Then, she brought her children back to home and started life together with them. She bought clothes and important educational items for her children. Now they are students in grade 5 and 7. She is also so proud to witness the market stabilizing effect of Boloso -1- Taro and nonexistence of mal-nutrition problem in the area after introduction of taro seed by Concern worldwide. She said "every food commodity becomes cheaper in Taro harvesting months and diseases related to food shortage are almost forgotten". "We lost almost 50% of newly born children before few years, but now it has been history".

W/ro Mogite Pola is one of woman household heads in Borkoshe Kebele of Kindo Koysha Woreda. She was the poorest person who had nothing to eat before taking a part in Concern interventions. She took 2.5 quintals of Boloso 1 Taro at the beginning of interventions. She was not able to plant all Taro seed provided to her on her own land since she has a challenge of land shortage. Then, she took the remaining taro seed to farmers who are not involved in the project. She planted it there with a consensus to share the product. She saved 80% of the taro product as a food source and the remaining is deposited as a seed. Now she is free from extreme hunger and very glad for that. She said, 'Boloso 1 Taro is a Blessing as it is locally named 'Bereket' by farmers indicating the better yield and its power to fill household consumption demand". This story is shared by many beneficiaries in Kindo Koyisha.

Table 7 : Results of Linear Regressions Analysis (dependant variable Yield of Bolos 1 Taro collected in 2006)

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-.153	3.180		-.048	.962		
sex 1M2F	.038	.212	.009	.182	.856	.882	1.134
Age	.066	.062	.065	1.069	.288	.565	1.771
formal edu/not	1.66	.978	.087	1.696	.094*	.800	1.249
total Family siz	-.228	.377	-.059	-.606	.547	.222	4.508
Family indepdsiz	.216	.451	.048	.478	.634	.208	4.809
family drop outs 2006	-2.152	.898	-.151	-2.397	.019**	.528	1.893
HH Migration 2006	.281	1.518	.010	.185	.854	.695	1.439
Extent of agricultural facilities	1.88	1.078	.098	1.746	.085*	.667	1.499
Extent of market info. facilities	-.175	.410	-.025	-.427	.671	.600	1.668
crop yield 2006	.368	.019	.972	18.903	.000***	.797	1.254
total cattle 2006	.222	.289	.042	.767	.446	.693	1.444
shot 2006	.042	.333	.007	.126	.900	.739	1.352
chicken 2006	-.186	.450	-.021	-.413	.681	.815	1.227
market dist	-.389	.121	-.177	-3.201	.002***	.686	1.457
Income from taro 2006	.001	.003	.011	.200	.842	.747	1.339
remittance income 2006	.014	.018	.047	.787	.434	.594	1.683
Model summary	R	R Square	Adjusted R square		Std.error of the estimate		
	.944	0.891	0.868		6.413		

*Significance level: ***,** and * justifies significany at 1%,5% and 10% respectively.*

The econometric approach employed was linear regression Model to sort out institutional, social and biological factors that contributes for improvement in the yield of improved taro disseminated by the Project to targeted beneficiaries. From the explanatory variables employed, market distance in km, other major crop yield, quantity of household information facilities (radio, tape recorder and mobile) owned, attendance in formal education and extent of family drop outs significantly affected the yield of improved taro collected per household.

Attendance in formal education: Attendance in formal education was one of explanatory variable affect significantly the level of taro production in 2006EC fiscal year and defined as 1 for those attended formal education and 0 (zero) otherwise. Attendance of formal education for small scale farmer increases the probability of taro yield obtained per households in 1.6 times, holding the other explanatory variables constant. The Attendance in formal education improved the awareness of the small scale farmers in following improved cultivation techniques and enable to share experience from others, the households that attended formal education own better yield of the taro, in comparison to households that did not attended formal education,

Extent of Family drop outs: This is one of the estimates that affected negatively the level of taro productivity in the household in the study district. The coefficients of the specific independent variables was -2.15.The regression result confirmed that when the number of family drop outs increase by one unit, the extent of taro yield decreased by more than 2 unit, keeping other independent variables constant. Since the family members dropped out the education move to other area in search of jobs and income earning activities, their contribution for taro production becomes zero inform of seed preparation, land cultivation, weeding and harvesting tasks that have high value in productivity of the specific crop, consequently the number of family drop outs negatively affected the productivity.

Quantity of farm tools owned: The coefficients of the predicator was 1.88. This indicates that havening one extra agricultural facilities such as hoe, ox plough set and spade, induces increment in the yield of Taro productivity at household level, keeping the other explanatory variable constant. Since owning farm tools helps to cultivate, earth up, weed and harvest the crop, it has positive role in productivity of taro in the district. Hence, enabling the small scale farmers to have adequate farm tools could promote the productivity of cropping and needs project support for provision.

Yield of other major crops cultivated: The coefficients of the estimate was .368. The result implies that the yield obtained from other major crops such as cassava, teff, sorghum and common bean own positive role in the yield of Taro. The extent of care taken for one major crops provokes production cares to be taken for other crops cultivated ,consequently, the yield collected form one crop induces farmers to cultivate, weed and harvest in better manner and to earn more from the subsequent crops.

Market Distance: The parameter estimate for variable market distance was -.389. This indicates that the farming communities that located nearest to market point collect better yield of taro in comparison to farmer that found distant away from marketing point, given all other independent variables fixed. The research finding confirmed that the informal institution the so called market have significant role in the productivity of taro in the study district. Hence linking the improved taro variety producer to the market, adoption of value chain development in form of cattle fattening, milling and branding the powder of the crop could optimize the productivity and support in food and nutritional security of the farming community.

IV. Conclusion and Recommendations

The study reveals that the contribution of taro on the overall livelihoods of the beneficiaries is significantly high. The impact of Boloso-1-Taro ranges from saving life to reduction of migration and school dropout rates. It has also diversified income for the beneficiary farmers in general and able to generate income from selling taro production that empowered women and changed the family's living status. Hunger and complete poverty has been eradicated from the project sites mainly due to taro intervention. The interviewed farmers also confirmed that the improved taro variety played a significant role in price stabilization in the district, which justified by the market price reduction of common food crops after intervention in the district. Taro is better than most common crops interims of yield per hectare, adaptability to different areas, market stability, drought tolerance, contribution to family health and scalability. In relation climate resilience, higher productivity per ha ,multipurpose function of the improved taro variety for both human food and livestock supplement and adaptability to various range of weather, adequate and timely Improved taro seed dissemination, adoption of value chain development cattle fattening, milling and linking producers to market benefit and scaling up believed further optimize the crop productivity there by play a significant role in nutritional and food security improvement of the communities.

Regression result of factors determining the productivity of improved Boloso 1 taro indicated that the productivity of the specific crop varies across farming community due to social, cultural, natural and environmental capability of the households. From explanatory variables used in the regression, attendance in formal education, extent of family drop outs, quantity of farm tools the household own, yield of other major crops and market distance to farmers' residence significantly affected productivity of improved taro. Attendance in formal education, farm tools owned, other major crops yield positively affected the productivity, while the extent of family drop outs and market distance negatively influenced the extent of improved taro yield collected per households. The study result confirmed that enabling the farming communities to attend formal education, owning adequate farm tools and improving the farm management capabilities ought to be the major assignment for the projects and other agricultural development programs working in the district.

One of the challenges exist in the study area is lack adequate of improved taro seed, erratic rain fall, untimely supply of the seed, awareness problem in value addition practices using taro as livestock supplement, which is pertinent for improvement of yield and efficient utilization of the resources thereby improve the food and nutritional security of farming communities in sustainable manner.

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