

# Pre-extension Demonstration and Evaluation of Potato Technologies in Selected AGP-II Districts of Harari Region

Abdulaziz Teha, Bedasso Urgessa, Oromia Megersa

Oromia Agricultural Research Institute, Fedis Agricultural Research Centre, Harar, Ethiopia

## ABSTRACT

Pre-extension demonstration and evaluation of potato varieties with the objectives of promoting and popularizing potato varieties, creating awareness, and improving farmers' knowledge and skills were conducted during the production season. Fifteen trial farmers were selected from two potential potato-growing kebeles of the Harari region. Two FRGs having 30 farmers were established at each kebele. Two improved potato varieties Bubu and Gudane and one local variety were planted on a plot of 40mx40m per variety. Trial farmers were used as replication. Training in which a total of 38 participants took part was also organized at Harari Region. Potato varieties were evaluated based on their tuber size yield, storability, and disease tolerance. Agronomic data and yield data were collected and analyzed using descriptive statistics. Based on the yield data (23.8 ton/ha) and (23ton/ha) compared to local check (15.3 ton/ha) were obtained from Bubu, Gudane, and local varieties respectively. Bubu has 55.56 % and 50.32 % Gudane yield advantage over the local check. Thus Bubu ranked first by tuber yield, Gudane second, and both varieties are recommended for scaling up.

**KEYWORDS:** *Bubu, Gudane, Demonstration, Harari Region*

## INTRODUCTION

The potato (*Solanum tuberosum* L.) is the fourth most important food in the world (Naz *et al.*, 2011). Over one million highland farmers could grow potatoes in Ethiopia (Vita and CIP, 2013; Adane *et al.*, 2010). It is a major part of the diet of half a billion consumers in developing countries (Mondal, 2004). Potato is an important food and cash crop in eastern and central Africa, playing a major role in national food security and nutrition, poverty alleviation, and income generation, and employs in the production, processing, and marketing sub-sectors (Lung'aho *et al.*, 2007). One medium-sized potato has 110 calories and provides complex carbohydrates, amino acids, and antioxidants. Rural women provide most of the labor in both small- and large-scale potato productions, from conservation, and seed selection to planting, harvesting, storing, and marketing making potatoes a very 'gender-sensitive' crop (Vita and CIP, 2013).

Bubu and Gudane are among the potato varieties released from Haramaya University and Holota Agricultural Research Center respectively. Bubu is a

medium-maturing and high-yielding potato variety with tuber size, taste, and shape preferred by the farmers and its tuber yield is 31.96 (tons/ha) with 99 days to maturity and 44 days to flowering (Girma and Niguise, 2015). Gudane tuber yield 31.50 tons/ha with 71 days to flowering and 108 days to maturity (Lamessa & Zewdu, 2016). The objective of this study is to evaluate and demonstrate Bubu and Gudane potato varieties in AGPII- Selected District of Harari Region (Dire Tayara). This project aims to alleviate these problems of low-quality Potato Seed and ensures the benefits to be obtained from these improved potato varieties.

## Specific Objectives

- To evaluate the productivity and profitability of improved potato varieties under farmers' conditions.
- To create awareness among farmers, developmental agents, subject matter specialists, and other participant stakeholders on improved potato variety production.

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- To build farmers' knowledge and skills in the production and management of the enterprise

## Methodology

### Description of the study area

This pre-extension demonstration of potato varieties was conducted in (Agricultural Growth Program-II) nationally selected districts of the Harari region. Harari regional state is located at a distance of 526 km from the capital city Finfinne in the direction of the country's eastern part. It is bordered by the Oromia region and hosts one capital town of the Oromia regional state's zone which is East Hararghe. The climatic condition of the region includes highland, midland, and lowland. The soil types that exist in the region are clay, loam, sandy, and black types (World Bank, 2013). These selected Districts are where the potentiality of the program succeeded in considering residents' problems, and the potential succession of the technologies these fit problems and solve; including the outcomes that prevailed in AGP-I.

### Site and farmers' selection

One district from Harari Region (Dire Tayara) was selected by AGP-II for this study. From the District, the kebele were selected purposively based on the potentiality, and appropriateness of the area by considering lodging, slop's, landscape, access to roads, and suit for monitoring and evaluation in the process of sowing to harvest. Farmers were selected purposively based on their interests, land provision for this pre-extension demonstration, interest in cost-sharing, willingness to share experiences with other farmers, and studying their profile with the participation of DAs and community leaders. The selected farmers were grouped in the form of Farmers Research Group (FRG) with the member of 15 farmers per kebele in consideration of gender issues (women, men, and youth). A total of 2 FRGs (FRG/kebele) and 15 farmers per FRG and a total of 30 farmers were grouped into 2 FRGs. In the FRG 5 farmers were trial (3 male trials and 2 female trials) farmers and 10 farmers worked with trial farmers.

**Table 1: Summary of selected site and farmers with area coverage of the experiment**

District	PAs	No. of trial farmers	FTCs	Area covered
Dire Tayara	Dire Tayara	10	1	40mx40m for each plot
Total		10	1	

Source: Own computation 2017/18

### Research design

Two improved treatments (Bubu and Gudane) potato varieties and one local check were replicated across five trial farmers per kebeles. Two improved and one local check were sown on 20 farmers land. A plot size of 40m\*40m was used on an individual trial farmer for each variety. Spacing for Gudane and Bubu 75cm\*30cm (between row and plant) respectively. Five trial farmers per kebele were used as replications of the varieties. The fertilizer rate (150 kg/ha DAP and 117 kg/ha UREA was applied as recommended by research and the seed rate was 15-18 qt/ha (MoRD, 2011).

### Technology evaluation and demonstration methods/technique

The evaluation and demonstration of the trials were implemented in farmers' fields to create awareness about the potato varieties. The evaluation and demonstration of the trials followed the method demonstration approach by involving FRGs, development agents, and experts at different growth stages of the crop. The activity was jointly monitored by FRGs, researchers, experts, and development agents.

### Data Collection

Both quantitative and qualitative data were collected through personal field observation, individual interviews, and Focus Group Discussion by using checklist and data sheet tools. Types of collected quantitative data were many farmers who participated in FRG, yield performance, and the number of stakeholders who participated in the training. Qualitative data were farmers' perceptions toward the new technology and ranked using pairwise ranking and Matrix ranking.

### Data analysis

Quantitative data was summarized using simple descriptive statistics such as mean, frequency, and percentage and SPSS software version 20 while the qualitative data collected using group discussion, key informant interviews, and field observation were analyzed using narrative explanation and argument. Data from different sources was triangulated to get reliable information.

## Results and Discussion

### Training of stakeholders

The multidisciplinary research team; crop, extension, and socio-economic research team, and other stakeholders (Offices of Agriculture and Natural Resource) actively participated by sharing their experience and knowledge.

Development agents, experts, and farmers participated in the training given on potato production and management, post-harvest handling, and marketing information.

**Table 2: number of participants in the training at Dire Tayara**

No.	Participants	Dire Tayara		
		Male	Female	Total
1	Farmers	25	9	34
2	DAs	2	0	2
3	District experts	2	0	2
	Total	29	9	38

Among the training participant stakeholders, 89.5% were farmers. Of those farmers, 26.5% are female farmers participants. Different extension materials were prepared and distributed to the participants. For those individuals, 30 leaflets and 20 small manuals on the technology that are organized in Afaan Oromoo and English languages were distributed. During the training, different questions, opinions, and suggestions were raised and reacted by the concerned bodies. Most farmers showed high interest in improved potato technology production because of better grain yield and earned income by selling seeds to different stakeholders (neighbors' farmers and non-governmental organizations) as compared to the local seeds. All farmers were very interested in having the technology for their future production. Therefore, all concerned bodies shared their responsibilities for future intervention.

### Agronomic and yield performance

The following table describes the yield performances of the demonstrated varieties across the study site. The grain yield performance of the improved varieties (Bubu, Gudane, and local) was 23.8 ton/ha, 23 ton/ha, and 15.3 ton/h at Dire Tayara respectively. The average tuber yield performance of Bubu and Gudane showed a statistically significant tuber yield difference at 5% probability level over the local check but no significant tuber yield difference was observed between the two improved varieties.

**Table 3: Yield performance of improved potato varieties on the Farmers' land.**

PA	Varieties	Mean ton/ha	Maximum	Minimum
Dire Taya	Bubu	23.8	26.7	22.4
	Gudane	23	25.8	21
	Local	15.3	16.3	14.3
Total	Bubu	23.8	26.7	22.4
	Gudane	23	25.8	21
	Local	15.3	16.3	14.3

The result indicated that the demonstration of potato varieties of Bubu and Gudane obtained a higher tuber yield (23.8 ton/ha) and (23ton/ha) compared to local check (15.3 ton/ha) respectively. The percentage increases of the improved varieties over the local check were 55.56 % by Bubu and 50.32 % by Gudane under farmer conditions. This showed that improved potato varieties had advantages over the local check.

**Table 4: Summary of yield performance in the study areas**

Varieties	Average yield ton/ha	Yield difference	Yield advantage over the local check (%)
Bubu	23.80	8.5	55.56
Gudane	23.0	7.7	50.32
Local check	15.3	-	-

Source: Own computation

### Farmers' Perception

Farmers in the study area selected the best-performing improved potato varieties by using their criteria. Farmers set these criteria after having know-how about the varieties and using those criteria they could select the varieties at harvest time. The opinion of those farmers on varietal preference was collected during a variety demonstration. The major criteria used by farmers were; tuber yield, marketable tuber size, storability disease tolerance, and maturity. Based on the above criteria; farmers evaluated the varieties and ranked Bubu first followed by the Gudane variety. Therefore, most farmers selected both improved varieties to reuse on their farms for the future.

**Table 5: Ranks of the varieties based on farmers' selection criteria at Dire Tayara district**

Crop varieties	Farmers rank	Reasons
Bubu	1 <sup>st</sup>	Good Tuber yield, Good Marketable Tuber Size, Relatively good Storability, Disease tolerance, and Medium maturity.
Gudane	2 <sup>nd</sup>	Good Tuber yield, Good Marketable Tuber size, Good Storability, Disease tolerance, and Medium maturity.
Local check	3 <sup>rd</sup>	Low Tuber yield, Low Marketable tuber size, Good storability, low disease tolerance, and Late maturity.

**Table 6: Pair-wise ranking matrix result to rank variety traits at Dire Tayara district**

Code no.	Traits	Tuber yield	Marketable tuber size	Storability	Disease tolerance	Maturity	frequency	Rank
1	Tuber yield	1	2	1	1	1	3	2nd
2	Marketable tuber size	2	1	2	2	2	4	1st
3	Storability	3	3	1	3	3	2	3rd
4	disease tolerance	4	4	4	1	4	1	4th
5	Maturity	5	5	5	5	0	0	5th

### Conclusion and Recommendations

The results revealed that significant differences were observed in tuber yield between improved and local potato varieties. The most critical decision of farmers is based on tuber quality with the intended market and economic benefit to them, storability, disease tolerance, and maturity. According to this study result, Bubu and Gudane varieties are superior in total yield and marketable yield in Dire Tayara of Harari Region. Therefore, the research center and agricultural office should further promote the Bubu variety in the study area and similar agroecology.

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