

# Pre-Scaling Up of Irish Potato (*Solanumtuberosum*) Technology in Bule Hora District of West Guji Zone, Oromia National Regional State, Ethiopia

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**Abstract:** Potato is considered to be an important tuber crops in Ethiopia and plays a crucial role in improving the livelihood of smallholder potato producers. The research activity was conducted for two consecutive years (2012/13 to 2014/15) main cropping season in the Bule Hora district of West Guji Zone with the objective of improving farmers' income, developing local capacity for future scaling up of potato technology and strengthening linkage among relevant stakeholders in the study area. For this research activity, a total of forty (40) farmers in the district were selected and participated in the implementation of the pre-scaling up of the technology. Training was given to the selected farmers on the production and productivity of Irish potato. Both quantitative and qualitative data were collected. Quantitative data like income and yield data were analyzed using descriptive statistics and qualitative was analyzed through narration. The result of the study revealed that the yield performance of pre-scaled up Gudane Irish potato was 38.75 and 40.25 and 43.65 and 43.38 qt/ha for 2012/13 and 2014/15 cropping seasons at Garba and Hera Liphitu kebeles respectively. Moreover, during the field day, Gudane potato variety was found to be outstanding and promising in terms of yield and appreciated by the participated farmers. Therefore, the study recommends that all the concerned bodies should scale up Gudane Irish potatoes varieties further in the Bule Hora districts in particular and with similar agro ecology in general to improve potato production and productivity of small scale potato producers.

**Keywords:** Pre-Scaling up, Irish Potato, Multidisciplinary, Gudane, Bule Hora

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## 1. Introduction

Irish potato (*Solanumtuberosum*) is an edible tuber plant, which is truly native to South America. Irish potatoes are named after Ireland as they are closely associated with the Irish during which a historical famine caused by a mold infestation of the Irish potato crop occurred [1]. It also one of the most root crop that is widely grown in the world as well as in Ethiopia. It is a short duration crop that can mature within short period of time. Potato production has been considered as the first priority compared to other food crops because of its contribution to food security, income generation and double cropping advantages and its utilization in different forms [2]. White potato became an essential staple in the diets of common people throughout Europe. In Ireland, where the crop did extremely well, potato was the

only staple food. It is also advantageous in that its consumable part, the tubers, are below the ground that not subjected to some vertebrate pests like birds and to some insect pest attack.

Potato (*Solanumtuberosum* L.) is considered to be an important tuber crops in Ethiopia and plays a crucial role in improving the livelihood of smallholder potato producers. It has been thought as an intended crop by the government of Ethiopia aiming at ensuring food security and economic benefits to the country. To meet the ever increasing growing population of the country and improve the livelihood of smallholder potato producers, there is a need to increase the production and productivity of potatoes in particular and the whole crops in general [3, 4]. It is assumed to be the world's fourth-largest food crop next to rice, wheat, and maize [5]. On the other hand, from vegetable crops it is the second crop

next to enset (*Ensete ventricosum*) in area coverage in Ethiopia and also gives high yield per unit area [6]. Despite its contribution to food security and improving the livelihoods of the small scale farmers in the country, the yield of potato production is low due to potato disease and shortage of improved variety in the country [7]. Based on these problems, Yabello Pastoral and Dryland Agriculture Research Center (YPDARC) has conducted adaptation and demonstration of the improved many Irish potatoes under farmers condition in the study area. Among the demonstrated varieties, Gudane variety was found to be significantly higher in a yield and demanded by the market compared to other varieties [9]. Therefore, this research activity was intended to pre-scale up of improved Irish potato variety and seed production techniques to farmers in major Irish potato growing areas of West Guji Zone, particularly, in Bule Hora District.

## 2. Materials and Methods

### 2.1. Description of the Study Area

Bule Hora is located at a distance of 475km away from Addis Ababa, the capital city of Ethiopia, in southern Ethiopian rift valley and has an altitude of 2244m.a.s.l. The district is characterized by bi-modal type of rain fall and the average annual rain fall ranges from 700mm-900 mm. Main rains fall season starts in March and reaches its peak in November. According to the soil map of Ethiopia (National Atlas), the district has three dominantly occurring soil types. The first two are orthicacrisols, which cover about 65% and orthicluvisols 15% of the total area of the district, while calcareic and eutricfluvisols covers about 10% of the area of the district. Dystricnitosols and chromic eutric and cambisols cover about 10% (each 5%) of the total area of the district [10].

### 2.2. Technology Dissemination Mechanisms

Multidisciplinary and Participatory extension approaches were employed during the implementation of this research activity. Multidisciplinary team of Yabello Pastoral and Dryland Agriculture Research Center (YPDARC) researchers consisting of crop breeder, pathologist, agronomist and agricultural Researcher extensionist were established for the implementation of the research activity.

Joint planning, training on capacity building for concerned stakeholders, packaging and distribution of Irish potato technologies and other agricultural inputs, organizing farmers into FREGs (Farmers Research Extension Groups), joint monitoring and evaluation, and facilitating seed delivery mechanisms were conducted for enhancing efficiency and effectiveness as well as for the sustainability of the research work outputs.

### 2.3. Site and Farmers' Selection

Two potential kebeles from Bule Hora district were purposively selected based on their potentiality for Irish

potato production and accessibility to road for ease of monitoring and evaluation. It was implemented for two years (2012/13-2014/15). 40 model farmers were selected based on their interest towards the technologies, willingness to manage and allocate field for the purpose of pre-scaling up of this technology. During the selection of farmers the gender issues was considered to keep gender balance of both male and female. The district agricultural office experts and Development Agents (DA) had also taken part in the implementation process.

### 2.4. Research Design and Materials Used

One best performing improved Irish potato variety (Gudane) was planted on selected farmers' plot size of (20m \* 20m= 400m<sup>2</sup>) during the main season. The variety was treated with full recommended package of Irish potato production. YPDARC (Yabello Pastoral and Dryland Agriculture Research Center) has provided farmers with all agricultural inputs (seed of improved Irish potato variety/'Gudane', fertilizers-DAP and UREA.

### 2.5. Capacity Building

Before the start of the research project, both theoretical and training was given for the selected farmers and development agents (DA's) on the production and productivity of the Irish potato and all agronomic practices by respective researchers from Yabello Research Center.

### 2.6. Data Collection

Both qualitative and quantitative data collected. Quantitative data like yield, total number of farmers and stakeholders participated on training and field day, number of farmers becomes aware of the relative advantage of the technology, role and perceptions of farmers and stakeholders on the technology were collected through spreadsheet, checklists, interview, focus group discussion and field observation.

### 2.7. Method of Data Analysis

The collected data (quantitative data) were analyzed by using descriptive statistics such as average and frequency distribution while qualitative data were analyzed using narration and themes.

## 3. Results and Discussion

### 3.1. Yield Performance

The yield performance of pre-scaled up Gudane Irish potato was 38.75 and 40.25 and 43.65 and 43.38 qt/ha for 2012/13 and 2014/15 cropping seasons at Garba and Hera Liphitu kebeles respectively. The average production of Gudane Irish potatoes was higher in the 2014/15 cropping season compared to the 2012/13. The variety showed conspicuous field performance and was highly appreciated by the farmers for its field performance and disease tolerant.

The difference in yield between the two cropping season could be justified by the fact that the heavy rain during the 2014/15. This finding is consistent with the result of other

studies which indicated that the improved potato varieties were superior to local check Hailu *et al.* [8] and Korji and Kebede [11].

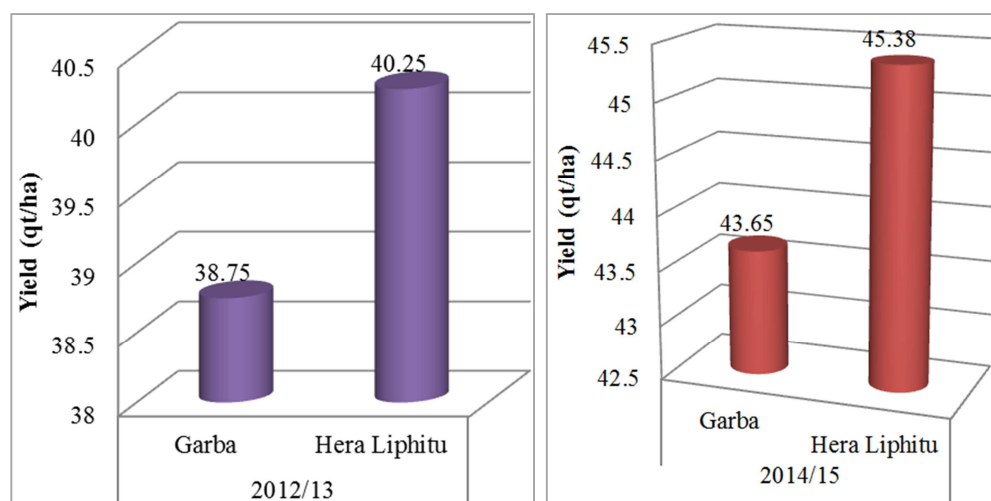


Figure 1. Average yield performance of Gudane variety of Irish potato across sites and year.

### 3.2. Training of Farmers and Other Stakeholders

Before the beginning of scaling of Irish potato both theoretical and practical training was given on Irish potato production and management practices by Horticultural researchers, pathologists and agricultural extensionist during

2012/13 and 2014/15 cropping season (Table 1). Accordingly, a total of 47 and 62 relevant stakeholders (farmers, Experts and Subject matter specialists were participated in the training during 2012/13 and 2014/15 cropping season respectively. In terms of gender, the total number of female participant was 25.7% while the remaining 74.3% were male.

Table 1. Training given for farmers and other stakeholders on Irish potato production and productivity at Bule Hora district.

Year	Participants						Grand Total
	Experts (DA + SMS)			Farmers			
	Male	Female	Total	Male	Female	Total	
2012/13	5	2	7	28	12	40	47
2014/15	6	2	8	42	12	54	62
Total	11	4	15	70	24	94	109

Note: DA= Development Agents, SMS= Subject Matter Specialists

Source: Own computation, 2015.

### 3.3. Seed and Fertilizer Distribution

A total of 40 Quintals of Irish potato seeds, 5 Quintals DAP and 3.20 Quintals UREA were distributed to 40 trial farmers participated in the research activity.

### 3.4. Monitoring and Evaluation

Since the beginning of pre-scaling up activity of Irish potato, regular joint monitoring and evaluation, and provision of technical advice were undertaken at different crop stages based on the practical problem observed on the spot in the implementation areas.

### 3.5. Field Days

A field day was organized jointly in collaboration with

other stakeholders (Experts from zone and district level agricultural development offices and participant farmers) at each research sites so as to show the overall performance of the Irish potato technology and a total of 215 (70 females and 145males) participants were attended this event including FREGs members.

### 3.6. Farmers' Reaction/Feedback

During the course of the pre-scaling up process, and at the final stage of the research activity, an assessment was made to know how the farmers perceived the technology. Accordingly, the result of the assessment showed that Gudane variety of Irish potato was preferred by farmers for its yield, early maturity and marketability and the farmers asked to further scale-up and out the variety in a wider areas (Table 2).

**Table 2.** Preference of Gudane variety of Irish potato as evaluated by farmers at the two sites.

Variety	Garba farmers (N=20)		Disease resistance	Market preference	Sweetness	Yield
	Size	Early maturity				
	%	%	%	%	%	%
Gudane	20	5	15	20	10	30
Hera Liphitu farmers (N=20)						
>>	10	10	20	30	5	25

### 3.7. Exit Strategy

Upon the completion of the pre-scaling up of the Irish potato an exit strategy was organized by the facilitation of Pastoral and Dryland Agriculture Research Centre (YPDARC) through dispatching letters to the respective district and zonal agricultural offices so as to ensure sustainability of the technology, reach large number of farmers and cover a wider areas by sharing roles and responsibilities among partners. Accordingly, after discussing and agreeing to share their roles and responsibilities on how to ensure sustainability of the dissemination of the technology a handover of the technology was made among YPDARC, Zonal and District agricultural offices through putting their sign nature.

## 4. Conclusion and Recommendation

The study showed that the yield performances of pre-scaled up of Gudane Irish potato were 38.75 and 40.25 and 43.65 and 43.38 qt/ha for 2012/13 and 2014/15 cropping seasons at Garba and Hera Liphitu kebeles respectively. Moreover, it was noted during the study that Gudane Irish potato variety had been preferred by farmers and other relevant stakeholders during the field day and farm visit. The knowledge and skill gaps, attitude of the farmers were also enhanced through the provision of training and participation on exchange visits and field day. The dissemination of improved Irish potato seed technology was enhanced through farmer to farmer learning mechanisms, field days and farm visits through established FREGs (Farmers Research Extension Groups) approach and strong linkage among relevant stakeholders was enhanced for the sustainability and further scaling up of the technology in the study area in particular and in the similar agro-ecologies in general. In conclusion, the Gudane variety was preferred by farmers for its high yielder, early maturity, disease tolerant and highly demanded by market and played crucial role in food security at household level. Therefore, the study recommends that all concerned bodies (Agricultural research center, zonal and district agricultural offices and universities) need to work hand in hand so as to further scale up of the Gudane Irish potato in Bule Hora district in particular and in the similar agro-ecologies in general.

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## Conflicts of Interest

The authors have not declared any conflict of interests.

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