

Registration of *Bubu*, a Medium Maturing Improved Potato (*Solanum tuberosum* L.) Variety for the Eastern Highlands of Ethiopia

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Abstract: An improved potato (*Solanum tuberosum* L.) variety, *Bubu* (CIP-384321-3), is developed by the Root and Tuber Crops Improvement Program of the Haramaya University, Ethiopia and approved by the National Variety Release Committee in 2011. The performance of the variety was evaluated at five locations in the eastern part of Ethiopia from 2006 to 2009. The mean performance of *Bubu* over locations and years indicated that it gave 11.5% more tuber yield over the standard checks (*Harbassa* and *Gabissa*). Although it is not stable for tuber yield, it exhibited high sensitivity to environmental change and a better adaptation to high-yielding environments. *Bubu* is a medium maturing variety with tuber size and shape preferred by the farmers. The taste of boiled tubers was rated as very good by the farmers. The variety is recommended for the highlands of Eastern and Western Hararghe Zones with an altitude ranging from 1650-2330 meter above sea level.

Keywords: *Bubu*; Hararghe; Potato; Stability; Tuber Yield

1. Introduction

Ethiopia is known to have favorable edaphic and climatic conditions for high quality potato production. About 70% of the agricultural land in the country is situated at an altitude range of 1800-2500 m above sea level with annual rainfall of 600 mm or more which is conducive for high quality ware and seed potato production. However, the national average yield is approximately 10.5 tons ha⁻¹, which is very low compared to the world average of 16.4 tons ha⁻¹ (FAOSTAT DATA, 2004). Lack of well-adapted potato cultivars to the different agro-ecological zones of the country is the most crucial factor accounting for this low yield. To tackle this problem, the Potato Improvement Program of the Haramaya University was established in 1975 with the major objective of developing widely adaptable, high yielding and stable potato varieties with good resistance to biotic and abiotic constraints. To achieve this, the Program has been introducing potato germplasm having wider genetic base from the International Potato Center (CIP) and testing them across locations. After five years of trials, the Program managed to release one new high yielding and late blight tolerant potato variety (*Bubu*) with the consent of the National Variety Release Committee.

This variety is dedicated in memory of the late Wondimeneh Assefa who passed away untimely on April 21, 2011. He was a hardworking, dedicated, generous and loveable individual in our home institution, Haramaya University. The name given to this variety, *Bubu*, is his nickname that the author used to call him while he was with us in this world.

2. Origin and Pedigree

The variety *Bubu* (CIP-384321-3) was introduced from CIP and had gone through multi-location trials in the eastern part of the country. The selection and adaptation test results proved that it is one of the best varieties for regional release.

3. Main Morphological Characteristics of the Variety

The variety is erect in its growth habit and having an intermediate vigor and an average plant height of 66.8 cm (Table 1). Its flowers are pink in color and it requires about 41 and 99 days to flower and mature, respectively. The variety sets high number of tubers per hill with a shallow eye depth that are white in skin color and flat rounded in shape (Table 2).

Table 1. Major morphological characteristics of *Bubu* potato variety.

Variety	Growth habit	Vigor	Plant height (cm)	Flower color	Days to flowering	Days to maturity
<i>Bubu</i>	Erect	Intermediate	66.8	Pink	41	99

Table 2. Tuber characteristics of *Bubu* potato variety.

Variety	Tuber set/hill	Eye depth	Skin colour	Tuber shape	Tuber size distribution
<i>Bubu</i>	High	Shallow	White	Flat round	Medium – large

4. Yield Performance and Stability

The variety and two standard checks (*Herbassa* and *Gabissa*) were tested at Haramaya Langie, Kulubi, Hirna and Albereketete in 2008 and 2009 (Tables 3 and 4). The

mean performance of *Bubu* over locations and years indicated that it gave 11.5% more tuber yield over the standard checks (Table 5).

Table 3. Total tuber yield (tons ha⁻¹) of the *Bubu* variety and two standard checks tested at different locations in 2008.

Variety	Tuber yield (tons ha ⁻¹)						Over the checks
	Haramaya	Langie	Kulubi	Hirna	Arbarakate	Mean	
<i>Bubu</i>	36.91	27.10	22.32	36.55	36.91	31.96	12.14%
<i>Harchassa</i>	31.11	31.92	31.11	31.92	27.94	30.80	
<i>Gabissa</i>	32.19	25.16	26.94	25.16	21.53	26.20	

Table 4. Total tuber yield (tons ha⁻¹) of *Bubu* potato variety and two standard checks tested at different locations in 2009.

Variety	Tuber yield (tons ha ⁻¹)						Over the checks
	Haramaya	Langie	Kulubi	Hirna	Arbarakate	Mean	
<i>Bubu</i>	34.09	22.73	26.99	37.20	44.28	33.06	9.59%
<i>Harchassa</i>	30.07	23.57	24.67	35.84	42.74	31.38	
<i>Gabissa</i>	31.40	20.98	21.98	34.22	36.18	28.95	

Table 5. Two years (2008 and 2009) average total tuber yield (tons ha⁻¹) of *Bubu* potato variety and the two standard checks tested at different locations.

Variety	Tuber yield (tons ha ⁻¹)						Over the checks
	Haramaya	Langie	Kulubi	Hirna	Arbarakate	Mean	
<i>Bubu</i>	35.50	22.53	29.97	32.15	40.41	32.11	11.55%
<i>Harchassa</i>	30.59	24.28	27.89	33.88	35.34	30.39	
<i>Gabissa</i>	31.80	21.11	24.46	29.69	28.85	27.18	

According to Perkins and Jinks (1968), a genotype having a mean of a specific character higher than the overall mean, a regression coefficient (β_i) close to unity and deviation from regression coefficient (S^2d_i) of zero is considered to be superior for the character under

consideration. Based on these criteria, *Bubu* was found to be unstable for tuber yield and it is on the average responsive to changing environments and better adaptable to high yielding environments (Table 6).

Table 6. Estimates of stability parameters for tuber yield (tons ha⁻¹) of the *Bubu* potato variety and the standard checks.

Variety	Mean root yield (tons ha ⁻¹)	Regression coefficient (β_i) [†]	Deviation from regression (S^2d_i)
<i>Bubu</i>	32.11	1.06 ^{ns}	45.95 ⁺⁺
<i>Gabissa</i>	27.02	0.93 ^{**}	4.60 ⁺⁺
<i>Herbassa</i>	29.99	0.96 ^{**}	15.66 ⁺⁺

[†] ns = Not significantly different from unity at $p > 0.05$; ** = Significantly different from unity $p < 0.01$; ++ = Significantly different from zero at $p < 0.01$.

5. Reaction to Major Disease

The average of three years reaction of the potato varieties to late blight (Table 7) indicated that *Bubu* is more tolerant to the disease as compared to both of the standard checks.

Table 7. Late blight reaction of *Bubu* potato variety in comparison with the checks.

Variety	2007	2008	2009	Mean
<i>Bubu</i>	2	2	2	2.0
<i>Herbassa</i>	4	4	5	4.3
<i>Gabissa</i>	3	4	5	4.0

6. Quality Attributes

Bubu is a medium maturing and high yielding potato variety with tuber size and shape preferred by the farmers. The taste of cooked tubers is classed as very good by the farmers around Haramaya area (Table 8).

Table 8. Taste and physical characteristics of boiled tubers of *Bubu* potato variety.

Variety	Cooking ability	Peeling ability	Flesh color	Flesh texture	Flavour	After boiling	
						Integrity	Darkening
<i>Bubu</i>	Quick	Easy	Cream	Waxy	Very good	Skin surface slightly cracked	No

7. Adaptation

Bubu is recommended for the highlands of Eastern and Western Hararghe Zones with an altitude ranging from 1650-2330 meters above sea level.

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