Registration of 'Bulcha' and 'Lalo' Yam Varieties

Bikila Akassa*, Abraham Negera, Girma Chemeda, Tilahun Wandimu, Negash Teshome, Lelise Ararsa, Daniel Mekonin, and Meseret Negash

Bako Agricultural Research Center, P. O. Box 03, West Shoa, Ethiopia

Abstract: The name Bulcha was given to a yam (*Dioscereaalata*) variety with the pedigree name of BRC-8s, and the name Lalo was given to a yam (*Dioscorearotundata*) variety with the pedigree name of BRC-7l. The two varieties were evaluated under a regional variety trial for two years (2006 and 2007) at Bako, Gute and Tsige districts and released by Bako Agricultural Research Center in 2012. These two yam varieties showed superior performance particularly in terms of productivity and tolerance to disease across the years and locations. The two newly released varieties out-yielded the other tested yam genotypes on both research plots and farmers' fields. Bulcha produced tuber yields 66.45 and 31.4 t/ha and Lalo produced tuber yields of 46.0 tons and 22.7 t/ha on research plots and farmers' field, respectively.

Keywords: *Dioscoreaalata; Dioscorearotundata*; Genotype; Pedigree; Tuber yield

1. Introduction

Yams (*Dioscorea* spp.) are annual or perennial vines and climbers with annual or perennial underground tubers. They belong to the *Dioscoreaceae* family. This tuber-producing plant is popular in the humid and sub-humid tropics, particularly in Africa, the West Indies and parts of Asia and South and Central America (Knuth 1924) estimated that there are about 600 species in the genus *Dioscorea* L. The most important edible yams belong to only a few species, such as *D. rotundata* Poir. (white Guinean yam*), D. alata* L.(water yam, winged yam or greater yam), *D. cayenensis* Lam. (yellow yam or yellow Guinea yam), *D. esculenta* (Lour.) Burkill (lesser yam, potato yam or Chinese yam), *D. dumetorum* (Kunth) Pax (bitter yam or trifoliate yam), *D. bulbifera* L. (aerial potato yam), *D. trifida* L. f. (cush-cush yam), *D. oppositaauct.* (cinnamon yam) and *D. japonica* Thunb (Dumet and Ogunsola, 2008) .

Yam is a vine with roots and tubers popular in Africa, India, Asia and America for its excellent palatability and high nutritive value (Wilkin, 1998). Yams are mainly treated as annual during cultivation. People consume yam as cooked in various ways by boiling and mashing, roasting and frying or processed in to flour (Okaka and Anajekwu, 1990). The green parts of the plants can be cooked and consumed as a vegetable. It also used to produce starch (Anonymous, 2015). Yam tubers are also processed into several food products such as the yam flour, which are enjoyed in many parts of the tropics. Industrial processing and utilization of yam includes starch, poultry and livestock feed, and production of yam flour (Opara, 2008). Yams are mainly grown in tropical and subtropical climates and do not grow well at temperatures below 22 ^{0}C (71.6 ^{0}F) and are killed by frost. The optimum temperature for the growth of yam is between 25 and 30 ^{0}C. It grows optimally in well drained fertile soil with a PH between 5.5 and 6.5 in full sun or partial shade. It grows at precipitation of about 1000-1400 mm per year. Very wet soil may promote tuber rot (Anonymous, 2015). It is a preferred food and food security crop, rich in protein and minerals like calcium and phosphorus and vitamins (Opara, 1999). Mean protein content was 9.7% dry matter, with individual values ranging from 6.4% to 13.4% dry matter (Muluneh, 2008). Yam is mainly planted at the onset of the dry season in October, and harvested from the early-maturing landraces fill a seasonal gap in food supply during the months of May and June (Muluneh, 2008). The average world productivity of the crop was 9.6 mt. ha^{-1} and 9.4 mt. ha^{-1} in Africa. However, in Ethiopia, its yield was low (5-9t/ha at Bako) because of lack of improved varieties.

Yam is a crop of major economic and cultural importance in sub-Saharan Africa that accounts for about 95% of the world production (FAO 2004). As the crop is adapted to dry season planting (mainly at the onset of the dry season in October) early harvests in May fill a seasonal gap in food supply. The fact that it is preferred to the other root and tuber crops means yam is also an important cash crop, generating additional income for farm households (Muluneh, 2008).

2. Agronomic and Morphological characteristics

Bulcha is characterized by its vine and white colored tuber. Bulcha has broadleaves and long vines with big tuber size. On the other hand, Lalo has pale green color and small leaves with thin vines and tubers with a pink flesh color.

*Corresponding author. E-mail: dbibaba731@gmail.com

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Table 1. Agronomic Morphological characteristics of Bulcha and Lalo' yam varieties.

	Bulcha	Lalo
Adaptation area	Bako,Gute, Tsige	Bako, Gute, Tsige
Altitude (masl)	1500-1960	1500-1960
Soil	Nitosol	Nitosol
Seed rate	50000-53333	50000-53333
Plant spacing	70-80x25cm	70-80 x25cm
Fertilizer rate (kg/ha)		
DAP	100	100
UREA	100	100
Planting date	March-April	March-April
Days to maturity	240-270	240-270
Plant height (cm)	3.0	2.5
Growth habit	Climbing and twining	Climbing and twining
Leaf color	Light green	Pale green
Flower	No	No
Tuber skin color	Yellow	Pink
Tuber flesh	White	Pink
Crop pest reaction	Resistant	Resistant
Tuberyield (t/ha)		
Research field	66.45	31.46
Farmers' field	46.0	22.7
Outstanding values	High yielding	High quality
Year of release	2012	2012
Breeder/maintainer	BARC	BARC

masl = Meters above sea level.

3. Yield performance

Bulcha and Lalo varieties were evaluated against nine genotypes all collected from western part of the country at Bako Gute and Tsige areas of western Oromia for two consecutive years for adaptability and yield performance. Among the tested genotypes, Bulcha performed better with tuber yields of 66.45 and 46.0 t/ha on research and farmers' fields, respectively. However, Lalo variety was preferred by farmers for its good test quality which had 31.4.0 t/ha on research fields and 22.7 on farmers' fields (Table 2). In addition, these varieties were evaluated by farmers using a participatory variety selection approach. Thus, the two varieties were selected based on their high tuber root yields and other good agronomic performances and test quality (Table 2).

Table 2. Yield performance of tested accessions at different locations over years.

Acc	2006/07			2007/08		
	Bako	Gute	Tsige	Bako	Gute	Tsige
Roba	143.21 q-t	394.90 d-h	300.67 g-o	366.33 e-j	231.47 j-s	65.91 t
Haro	113.53 q-t	365.20 e-j	190.33 m-t	405.00 d-i	113.53 p-t	109.30 r-t
Dhokonu	194.20 m-t	343.50 f-l	318.00 f-m	432.33 c-g	191.50 m-t	102.87 ts
Talo	154.67 q-t	410.65 d-h	292.67 h-q	449.67 e-k	156.67 p-t	171.50 n-t
Misreta	202.48 l-t	398.83 d-h	195.67 m-t	380.00 e-i	359.67 e-j	144.50 q-t
Gudina	136.77 o-t	423.00 c-g	270.00 h-q	391.00 d-h	211.87 k-s	69.13 t
BRC-7l	212.40 k-s	398.93 d-h	310.33 g-n	564.33 abc	248.27 i-r	153.47 q-t
BRC-8s	416.60 d-g	633.70 a	579.33 ab	639.33 a	488.00 b-e	230.00 g-p
39/87	343.2 f-l	529.97 a-d	379.33 e-i	431.00 c-g	487.33 b-e	213.63 k-s
46/87	457.63 b-f	412.80 d-h	573.00 ab	529.00 a-d	299.45 g-p	137.00 q-t
CV (%)				27		

4. Stability performance /Adaptability

Yield stability for the ten yam genotypes was studied across three environments for two years. Varieties Bulcha and Lalo had the highest tuber yields and test quality respectively (Table 2). However, accession 39/87 and 46/87 have higher tuber yield as compared to the rest tested accessions; but they are wildish type and fibrous roots extended from the tubers. The varieties were found to be stable yield to the tested environments and could be recommended for western Oromia and other regions with similar agro-ecology in the country with appropriate agronomic practices.

5. Disease Reaction

In the study areas, there was no disease and insect incidence was observed on the two released and other tested varieties during the study periods.

6. Conclusion

The two varieties were found to be superior in yield and yield related traits to the other genotypes and were unaffected by diseases and insect pests. These varieties were selected also based on farmers' preferences for the high tuber yields and other desirable agronomic characteristics. Therefore, the varieties could be cultivated in the area to enhance food and nutrition security as well as smallholder farmers' income.

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