

Registration of "Tola" Sweet Potato [*Ipomoea batatas*(L.) Lam.] Variety

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Abstract: The name *Tola* was given to a sweet potato [*Ipomoea batatas*(L.) Lam.] variety with the pedigree of TIS 884-40, which was developed by Bako Agricultural Research Center between 2007 and 2010. The *Tola* variety and the other pipeline sweet potato genotypes were evaluated against the standard check (*Balo*) across three locations; Bako, Gute and BilloBoshe for two consecutive years (2009 and 2010) under regional variety trial. The variety *Tola* out-yielded the standard check (*Balo*) by about 80.378%. The variety also showed resistance to major disease and insects and it was found to be stable over the tested locations.

Keywords: Genotypes; *Ipomoea batatas*; Pedigree

1. Introduction

The sweet potato is a dicotyledonous plant that belongs to the family Convolvulaceae. Its large, starchy, sweet-tasting, tuberous roots are a root vegetable. The young leaves and shoots are sometimes eaten as greens. Sweet potatoes are high in energy, dietary fiber, potassium and vitamin C, low in fat and are important sources of the dietary antioxidant β -carotene (Hagenimana, E. Carey, J. Low. 1993). Sweet potato is native to the tropical regions in America (Purseglove, 1972). Sweet potato is an important crop grown for its storage root and above ground components. In Ethiopia, the sweet potato cultivation has been started long time ago and is used for food and feed (Tshome, 2002). Areas like Bako, Gute and Bilo-boshe are suitable for sweet potato production. In Ethiopia, Sweet potato is consumed commonly as boiled root for human, vines and leaves are feed to livestock. Among six sweet potato genotypes evaluated by the National Seed Release committee a variety named *Tola* (TIS 844-40) is released for the above areas and similar agro-ecologies.

2. Varietal Origin and Evaluation

Tola is the name given by the breeder to a released sweet potato variety with the pedigree of TIS 884-40. The fifteen germplasm received from Awassa Agricultural Research center were evaluated at

preliminary nursery observation from which six of them were promoted to variety trial during 2007 and 2008. The six pipeline sweet potato genotypes were evaluated against the standard check viz., *Balo* at Bako, Gute and Billo Boshe during 2009 and 2010 main cropping seasons under regional variety trial.

3. Agronomic and Morphological Characteristics

The released variety, *Tola* (TIS 884-40), has lobed leaf shape, creamy skin color of root, white flesh color and with axial leaf vein of purple spot in several veins (Table 1).

4. Yield Performance of Tola Variety

Tola variety was evaluated along with the standard check (*Balo*). The standard check was released for Bako and similar ecologies based on its adaptability and yield performance. *Tola* showed significantly higher tuber yield than the standard check across locations and years. *Tola* produced tuber yield of 5.436 t/ha on research plot and 3.22 t/ha on farmer field while *Balo* gave 3.2 t/ha on research field and 18.43 q/ha on farmers' field (Table 2). The newly released Tola variety showed yield advantage of 83% over the standard check, *Balo*.

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Table 1. Agronomic Morphological characteristics of Sweet potato, Tola (TIS 844 - 40) variety.

1. Adaptation Area:	Bako, Bilo and similar agro-ecologies
Altitude	1500-2010 meter above sea level
Soil	Nitosol
Rainfall	1035-1290
Temperature	13-28°C
2. Fertilizer rate	
P ₂ O ₅	46Kg/ha
N	64Kg/ha
3. Planting Date	best from mid-June to early July
4. Seed rate (cutting/ha)	33,333 cuttings
5. Spacing (inter x intra row)	100cm x 30cm
6. Days to Maturity	120 days
7. Vine characteristics	
Growth habit	Runner
Twining habit	No
Vine Length	98cm
Vine internodes length	4-6cm
Vine pigmentation	Green with many purple spots
8. Mature leaf shape	Lobed
9. Leaf lobes	
9.1 Type	Slight
9.2 Number	3
10. Leaf color	
Mature	Green with many purple spots
Immature	Green with purple edge
petiole pigmentation	Mostly purple
Petiole length	15-16cm
11. Root color	
Shape	Varied
Skin	Creamy
Flesh	White
Taste	Sweet
Fiber	No
12. Crop pest reaction	Resistant
13. Tube yield	
Research field	5.4.36 tone
Farmers' field	32.2 tone
14. Outstanding value	High yielding, Disease Resistant
15. year released	2012
Breeder/ maintenance	BARC

Table 2. Mean root yield (t/ha) across Locations and years in sweet potato regional variety trial.

No.	Acc.	2008/09			2009/10			Mean
		BAKO	Gute	Bilo-Boshe	Bako	Gute	Bilo-Boshe	
1	CN 175-24	210.6	78.1	49.1	463.49	178.15	388.89	332.92
2	TIS 844-40	299.4	58.2	358.3	738.1	430.37	636.67	543.62
3	4402-26	221.5	212	242.6	388.1	383.85	396.3	354.24
4	4400-27	206.7	50.1	33.9	330.95	97.04	142.59	175.62
5	MUGANDE	233.3	83.3	214.1	511.9	390.22	425.92	309.79
6	BALO	257.8	155.6	275.9	444.44	238.96	248.15	301.37
7	MEAN	238.8	106.2	195.6	373.08	290.43	373.08	
	CV (%)	10.4	14.8	15	22.89	18.83	15.89	
	LSD (5%)	44.94	28.67	53.3	19.93	97.93	108.22	
	F-value	**	**	**	*	**	**	

Key: ** highly significant, * significant.

Table 3. Number of Marketable roots per Plant.

No.	Acc.	2008/09			2009/10			Mean
		BAKO	Gute	Bilo-Boshe	Bako	Gute	Bilo-Boshe	
1	CN 175-24	9.07	3.8	19.27	17.53	27.33	19.26	16.04
2	TIS 844-40	4.47	2.73	4.8	9.6	21.33	4.8	7.95
3	4402-26	4.07	2.6	4.6	6.06	16	3.86	6.2
4	4400-27	6.53	2	5.8	9.6	14.66	5.8	7.39
5	MUGANDE	4	1.86	4.6	6.53	13.66	4.6	5.87
6	BALO	9	2.2	14.57	18.4	19.66	14.57	13.06
7	MEAN	6.19	2.73	8.81	11.22	22.12	8.81	
	CV (%)	21.3	30.3	23	30.84	18.77	23.04	
	LSD (5%)	2.39	1.39	3.39	6.29	7.55	3.69	
	F-value	**	**	**	*	**	**	

Key: ** highly significant, * significant.

Table 4. Weight of Marketable roots per plant (Kg).

No.	Acc.	2008/09			2009/10			Mean
		BAKO	Gute	Bilo-Boshe	Bako	Gute	Bilo-Boshe	
1	CN 175-24	1.207	0.06	0.357	2.99	2.033	3.066	1.694
2	TIS 844-40	1.76	0.72	2.12	3.526	2.6	3.48	2.368
3	4402-26	1.267	1.087	0.14	2.746	3.6	2.886	1.954
4	4400-27	0.973	0.427	0.17	1.686	1.333	2.073	1.11
5	MUGANDE	1.44	0.72	0.373	2.47	3.766	2.926	1.949
6	BALO	1.3	0.747	0.258	1.946	2.066	2.586	1.484
7	MEAN	1.324	0.717	0.57	2.546	2.566	2.836	
	CV (%)	18.9	27.5	28.5	20.94	36.99	21.05	
	LSD (5%)	-	0.358	0.295	0.97	1.72	1.08	
	F-value	ns	**	**	*	**	ns	

Key: ** highly significant, * significant.

5. Yield Stability of Tola

The six sweet potato genotypes were evaluated for root yield t/ha, number of marketable roots per plant, weight of marketable root kg per plant, root length (cm), root diameter. Sweet Potato variety Tola, is higher in mean root yield quintal per hectare, number of root per plant, root weight per plant across all tested locations.

6. Disease and Pest Reaction

Sweet potato is produced annually on over 53 thousand hectares of land with total production over 4,240 tons and average productivity of 8.0 tons per hectare. The production and productivity of the crop is extremely low as compared to other African and Asian countries where it gives more than 18 t/ha. The lower productivity of sweet potato is mainly due to the existence of common, major, minor and sporadic insect pests. Sweet potato weevil is known as the most pit fall for production and productivity of the crop followed by viral diseases in the country. In addition, sweet potato butterfly is the most devastating pest in major sweet potato growing zones in the country but its occurrence is sporadic based on agro-ecological condition (Shonga, *et al.*, 2013). Despite the above facts there was no disease and insect pest incidence observed during the variety development period.

7. Quality Attributes

Tola variety has attractive white root color with medium marketable size. the variety is resistant to major disease and insect pests with medium maturity period (4.5 months). Tola variety is high yield and has non cracking character at boiling.

8. Conclusion

Tola, sweet potato variety was released for the benefit of sweet potato growers (smallholder farmers and private investors) in Western Oromia (Bako, Gute, Bilo- boshe) and areas with similar agro-ecologies based on its higher root yield, disease resistance and desirable agronomic characteristics. Therefore, the release of the variety is expected to improve sweet potato production in Western Oromia in particular and similar agro-ecologies in the country in general.

9. Acknowledgment

The authors acknowledge the Oromia Agricultural Research Institute for funding the project. Special thanks go to all staff members of the Horticulture Technology Generation Team of the Bako Agricultural Research Center for the execution of the experiment.

10. References

- Shonga, E., Gemu, M., Tadesse, T., & Urage, E. 2013. Review of entomological research on Sweet potato in Ethiopia. *Journal of Agriculture and Food Science*, 1: 83 - 92.
- Hagenimana, E. Carey, J. Low, S. Gichuki, C. Owori, A. Oyunga and J. N. Malinga. 1993. "Sweet Potato Post Harvest in East Africa," CIP Sub-Project Annual Progress Report, CIP Library, Lima, pp 24 - 50.
- Purseglove, J. A. 1972. *Tropical crops: Dicotyledons*. Landon, Longman.
- Teshome Anshebo. 2002. Evaluation of sweet potato (*Ipomeabatatas* Lam.) clones for high yield storage root yield with high starch and low sugar content to substitute potato in Cuisine. PhD Thesis, Thailand Agricultural University.