



Performance of Greater Yam Genotypes in Konkan Region under Rainfed Conditions

N. V. Mhaskar, A. T. Jadye, N. R. Bhagwat, P. M. Haldankar and S. A. Chavan

AICRP on Tuber Crops, Central Experiment Station, Wakawali 415 712, Maharashtra, India

Corresponding author: N. V. Mhaskar, e-mail: namdev_mhaskar@rediffmail.com

Received: 6 March 2013; Accepted: 25 December 2013

Abstract

Field experiments were conducted during 2006 to 2010 at Central Experiment Station, Wakawali, Maharashtra to evaluate the performance of six genotypes of greater yam viz., Sree Roopa, Da-11, Da-25, Da-168, Da-199 and Konkan Ghorkand for yield and quality. The trial was conducted in randomized block design with four replications. The pooled results showed that the genotype Da-199 produced the highest tuber yield of 29.29 t ha⁻¹ and average tuber weight of 1.62 kg, which was significantly superior to all other genotypes. In multi-locational trials, it also produced significantly the maximum tuber yield of 21.39 t ha⁻¹ over the rest of the genotypes in four different locations. Cultivation of Da-199 generated the maximum net return of ₹ 2,42,078 ha⁻¹ and B:C ratio of 1.70. Among all the genotypes, Konkan Ghorkand and Da-199 had maximum score for all organoleptic characters.

Key words: *Dioscorea alata*, genotypes, tuber yield, quality, economics, Konkan

Introduction

Tuber crops have a remarkable position in the food security of the developing world due to its high calorific value and carbohydrate content. Greater yam (*Dioscorea alata* L.) is an important tuber crop grown in the high rainfall Konkan region of Maharashtra during *kharif* season. It is the most widely distributed species of yam. It is grown for its tubers, mainly used as a vegetable or for direct consumption after cooking. Sometimes, tubers are processed into appealing products like rava, powder etc., which is used in bakery industry. The climate of Konkan region is warm and humid and the rainfall is distributed between June and September. The soils are lateritic and well drained. Thus, the edaphic and climatic conditions are most congenial for greater yam cultivation. However, its cultivation is restricted to kitchen gardens and backyards in certain pockets and mostly traditional varieties are grown. There is diversity of greater yam types in Konkan region and those types are mostly having cylindrical and irregular tuber shape. Its yield potential is very poor and grows deep in soil. So its harvesting is

difficult. The various shapes and sizes of tubers appeared to be specific with genotypes (Velayudhan et al., 1991). The farmers of Konkan region are having poor yielding genotypes of greater yam. A high yielding variety with good quality would promote the cultivation of greater yam in this region. In view of this, an experiment was conducted to identify the best genotype of greater yam with high yield and better quality suitable for Konkan region of Maharashtra.

Materials and Methods

Field experiments were conducted at Central Experimental Station, Wakawali, Maharashtra during *kharif* seasons of 2006 to 2010. The Central Experimental Station is located at 17°40' N latitude and 73°16' E longitude at an altitude of 167 to 234 m above mean sea level. The soil of the experimental site was lateritic, with low soil fertility and slightly acidic pH (5.6). The soil was rated as low for available N (188.16 kg ha⁻¹), available P (8.78 kg ha⁻¹) and available K (127.68 kg ha⁻¹). The average total rainfall received during the entire

period of experimentation was 3086 mm. The experiment was laid out in randomized block design with four replications. Six genotypes of greater yam viz., DA-11, DA-25, DA-168, DA-199, Sree Roopa and Konkan Ghorkand were evaluated. Tubers of about 250 g were planted with the onset of monsoon at a plant spacing of 90 x 90 cm. The gross plot size was 3.6 m x 2.7 m. Recommended quantities of manures and fertilizers, FYM @ 10 t ha⁻¹ and NPK @ 80:60:80 kg ha⁻¹ were given. Nitrogen and potash were applied in two equal splits, half as basal, at the time of planting and the remaining half at 30 days after planting. Plant protection and weeding were done as per the package of practices recommendation. The harvesting of tubers was done after attaining maturity. During *kharif* 2010 the performance of the genotypes of greater yam was tested at four locations viz., Palghar (Thane), Karjat (Raigad), Awashi (Ratnagiri) and Vengurla (Sindhudurg). Each location was treated as a replication. The same package of practices followed at Wakawali was followed in all the locations. The data on tuber yield and yield characters were recorded and analyzed statistically (Gomez and Gomez, 1984). The tubers of each variety were subjected to organoleptic evaluation for colour, flavour and texture (Amerine et al., 1965).

Results and Discussion

Perusal of data in Table 1 revealed that the genotype Da-199 produced highest tuber yield in all the years, except 2009, and was significantly superior to Da-11, Sree Roopa and Konkan Ghorkand. However, Da-199 was on par with Da-25 and Da-168 during 2008. Da-168 produced the highest tuber yield of 29.60 t ha⁻¹ during 2009, but did not show any significant difference with Da-199 and Da-25. The maximum tuber yield of 35.71

t ha⁻¹ was produced by Da-199 during 2010 at Wakawali centre, which was significantly superior over the rest of the genotypes. The performance of Da-199 was also found superior at Jagdalpur and Thiruvananthapuram (AICRP, 2007; 2008) and at Jorhat and Jagdalpur (AICRP, 2009).

The pooled analysis of tuber yield of five consecutive years showed that greater yam genotype, Da-199 produced the highest tuber yield of 29.29 t ha⁻¹, which was significantly superior over the rest of the genotypes. The genotype, Da -25 ranked second in respect of tuber yield (31.26 t ha⁻¹). The genotypes, Sree Roopa, Da-11 and Da-168 produced tuber yield in the range between 21.69 and 25.57 t ha⁻¹. The check variety, Konkan Ghorkand produced the lowest yield of 10.24 t ha⁻¹. The tuber yield of Da-199 was higher by 19.05 t ha⁻¹ over the check, Konkan Ghorkand (Table 2).

The genotype Da-199 produced significantly highest yield per plant (3.40 kg) as well as average tuber weight of 1.62 kg over the rest of the genotypes (Table 2). The second highest yield per plant and average tuber weight was observed in the genotype, Da-11 (3.63 kg) and Konkan Ghorkand (1.087 kg), respectively. Further the number of tubers per plant observed in the genotype Da-168 (3.58) was significantly higher over the rest of the genotypes, except Da-25 and Sree Roopa.

The tubers of Da-25 and Da-199 were cylindrical in shape. The length of tuber was maximum in the genotype Da-25 (29.78 cm) and the next being in the genotype Da-199 (28.67 cm) (Table 3). Longer tuber length in Da-199 was reported at Jorhat (AICRP, 2011). Sree Roopa produced maximum girth of 45.58 cm followed by the genotype, Da-199 (39.34 cm). The length of vine and fresh weight of vine with leaves per plant were

Table 1. Performance of greater yam genotypes at Wakawali

Genotypes	Tuber yield (t ha ⁻¹)					MLT of research station 2010	Pooled mean
	2006	2007	2008	2009	2010		
Da-11	27.05	22.08	23.91	22.50	25.65	19.74	23.35
Da-25	29.90	26.16	24.37	28.92	31.26	18.54	26.36
Da-168	29.10	28.96	26.73	29.60	25.47	15.54	25.57
Da-199	33.84	29.65	27.48	29.38	35.71	21.39	29.29
Sree Roopa	21.26	19.68	22.16	23.38	26.92	15.10	21.69
Konkan Ghorkand	12.71	5.72	7.60	13.20	13.17	8.30	10.24
CD (0.05)	6.10	5.12	3.05	3.47	4.32	4.32	1.19

MLT: Multi-locational Trial

Table 2. Yield attributing characters of greater yam genotypes at Wakawali

Genotypes	Tuber yield increase over Konkan Ghorkand (t ha ⁻¹)	Yield per plant (kg)	Number of tubers per plant	Average tuber weight (kg)
Da-11	13.11	2.63	2.95	0.839
Da-25	16.12	2.48	3.38	0.698
Da-168	15.33	2.49	3.58	0.682
Da-199	19.05	3.40	2.43	1.620
Sree Roopa	11.45	2.50	3.43	0.654
Konkan Ghorkand	—	1.07	1.00	1.087
CD (0.05)	—	0.31	0.29	0.240

Table 3. Biometric and yield characters of greater yam genotypes at Wakawali

Genotypes	Tuber length (cm)	Tuber girth (cm)	Vine length (m)	Fresh weight of vine with leaves (kg plant ⁻¹)
Da-11	22.95	31.35	6.80	1.05
Da 25	29.78	29.16	6.06	0.84
Da-168	24.02	36.25	6.05	0.95
Da-199	28.67	39.34	6.87	1.11
Sree Roopa	19.46	45.58	6.69	1.05
Konkan Ghorkand	17.45	33.40	3.49	0.55
CD (0.05)	2.44	2.62	0.37	0.12

significantly the highest in Da-199 over the rest of genotypes, except Da-11 for length of vine and Da-11 and Sree Roopa for fresh weight of vine with leaves per plant as these genotypes were on par with Da-199.

At different locations in Konkan region, the significantly highest tuber yield of 21.39 t ha⁻¹ was produced by Da-199 over the rest of the genotypes, except Da-11 and Da-25, which were on par with Da-199 (Table 4). The genotype, Da-11 (19.74 t ha⁻¹) was the next good performer and was on par with Da-25 (18.54 t ha⁻¹) and Da-167 (15.54 t ha⁻¹) and significantly superior over Konkan Ghorkand and Sree Roopa. The lowest yield was produced by Konkan Ghorkand in all the four locations.

Data on the organoleptic characters viz., colour, flavour, texture and taste showed that Konkan Ghorkand and Da-199 had maximum score for all the organoleptic characters at Regional Fruit Research Station, Vengurla and Central Experiment Station, Wakawali locations (Tables 5 and 6). Acridity was not found in any of the genotypes, except Sree Roopa.

The economics of cultivation of different genotypes evaluated under Konkan region at cost C level revealed that the genotype, Da-199 generated the maximum net return of ₹ 2,42,078 ha⁻¹ and B:C ratio of 1.70, which was superior to the rest of the genotypes. This was followed by Da-25 with net return of ₹ 1,93,299 ha⁻¹

Table 4. Performance of greater yam genotypes under multi-locational trial in Konkan

Genotypes	Tuber yield (t ha ⁻¹)				Mean tuber yield (t ha ⁻¹)
	RARS Karjat (Raigad)	ARS Awashi (Ratnagiri)	ARS Palghar (Thane)	RFRS Vengurla (Sindhudurg)	
	R I	R II	R III	R IV	
Da-11	7.64	16.67	21.75	32.91	19.74
Da-25	6.83	6.79	26.24	34.29	18.54
Da-168	6.48	17.90	20.5	17.28	15.54
Da-199	12.13	19.14	29.6	24.69	21.39
Sree Roopa	8.41	7.41	16.78	27.78	15.10
Konkan Ghorkand	7.4	8.2	8.0	9.6	8.30
CD (0.05)					4.32

Table 5. Organoleptic evaluation of the greater yam genotypes at Regional Fruit Research Station, Vengurla, Maharashtra

Genotypes	Organoleptic score (1-9)				
	Colour	Flavour	Texture	Taste	Average score
Da-11	7	6	8	5	6.50
Da-25	8	7	8	7	7.50
Da-168	8	6	7	7	7.00
Da-199	8	7	8	8	7.75
Sree Roopa	7	6	8	7	7.00
Konkan Ghorkand	8	7	8	8	7.75

Table 6. Organoleptic evaluation of the greater yam genotypes at Central Experiment Station, Wakawali, Maharashtra

Genotypes	Organoleptic score (1-9)					Acridity score (1-4)
	Colour	Flavour	Texture	Taste	Average score	
Da-11	7.9	7.2	6.8	6.9	7.19	1
Da-25	6.7	6.6	6.2	6.4	6.46	1
Da-168	6.9	6.9	6.4	6.4	6.66	1
Da-199	7.7	7.4	6.9	7.4	7.38	1
Sree Roopa	5.8	6.0	5.7	5.9	5.84	2
Konkan Ghorkand	7.5	7.8	7.1	8.6	7.73	1

Table 7. Economics of cultivation of greater yam genotypes

Genotypes	Pooled yield (t ha ⁻¹)	Gross return (₹ ha ⁻¹)	Total cost of cultivation (₹ ha ⁻¹)	Net return (₹ ha ⁻¹)	B : C ratio
Da-11	23.35	466958	323882	143077	1.44
Da-25	26.36	527225	333926	193299	1.58
Da-168	25.57	511462	331299	180163	1.54
Da-199	29.29	585759	343682	242078	1.70
Sree Roopa	21.69	433846	318363	115483	1.36
Konkan Ghorkand	10.24	307250	297263	9,986	1.03

FYM: ₹ 1800 t⁻¹; Planting material: ₹ 30 kg⁻¹; Labour: ₹ 120 day⁻¹; Urea: ₹ 5.60 kg⁻¹; Single super phosphate: ₹ 3.60 kg⁻¹; Muriate of potash: ₹ 5.20 kg⁻¹; Selling price of tuber: ₹ 20 kg⁻¹ for all genotypes, except Konkan Ghorkand: ₹ 30 kg⁻¹

and B:C ratio of 1.58. The Konkan Ghorkand generated the least net return of ₹ 9986 ha⁻¹ and B:C ratio of 1.03 (Table 7).

Conclusion

The present study revealed that Da-199 was the best genotype for cultivation in the Konkan region with high yield and quality.

References

- AICRP. 2007. *Annual Report 2006-2007*. Central Tuber Crops Research Institute, Thiruvananthapuram, Kerala. pp. 53-56.
- AICRP. 2008. *Annual Report 2007-2008*. Central Tuber Crops Research Institute, Thiruvananthapuram, Kerala. pp. 67-70.
- AICRP. 2009. *Annual Report 2008-2009*. Central Tuber Crops Research Institute, Thiruvananthapuram, Kerala. pp. 75-80.
- AICRP. 2011. *Annual Report 2010-2011*. Central Tuber Crops Research Institute, Thiruvananthapuram, Kerala. pp. 64-68.
- Amerine, M. A., Pangborn, R. M. and Rocssler, E. B. 1965. *Principles of Sensory Evaluation of Food*. Academic Press, New York.
- Gomez, K. A. and Gomez, A. A. 1984. *Statistical Procedures for Agricultural Research*. 2nd Edn., John Wiley and Sons, New York, USA. 680 p.
- Velayudhan, K. C., Muralidharan, V. K., Amalraj, V. A. and Thomas, T. A. 1991. Genetic Resources of *Dioscorea alata* L. *Scientific Monograph No. 1*, National Bureau of Plant Genetic Resources Regional Station, Vellanikkara, Thrissur, India.