



MOLECULAR DIVERSITY IN THE LAND RACES OF CASSAVA IN INDIA



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INTRODUCTION

- Cassava, a native of South America, is an introduced crop in India.
- It is believed to have reached Indian shore through Portuguese travellers during the 16th century.
- Planned introduction done by a Ruler of South India during 1840's.
- Improved varieties were introduced by Researchers during 1940's.
- Only very few varieties were introduced in the beginning.
- Now, there are a number of varieties of diverse phenotype.
- This project was undertaken to measure the genetic diversity of the land races.

MATERIALS AND METHODS

- Four hundred land races available in the germplasm constituted the material for the study.
- The accessions were screened for morphological as well as yield characters.
- Duplicates identified based on morphological, biochemical and molecular markers (Harisankar *et al.* 2002).
- Varieties evolved in different decades were subjected to DNA analysis using RAPD markers.
- Twenty Random Primer of OPQ group were used.
- Genetic Diversity was analysed following Beeching *et al.* (1995).
- Genetic distance was estimated by the software-AAB ID Advanced.

RESULTS AND DISCUSSION

High variability was observed for morphological characters, especially colour of stem, petiole, emerging leaf, tuber skin, tuber rind and tuber flesh.



Fig.1. Cassava germplasm field at CTCRI, India Fig.2. Variability in morphology Leaf, Petiole

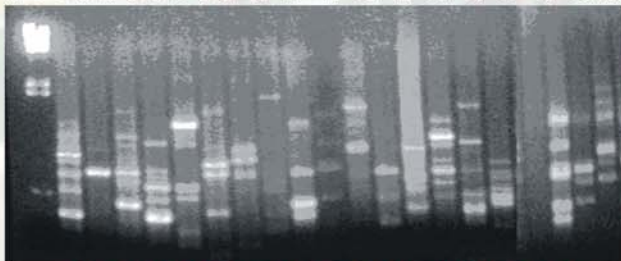
High variability obtained for shoot weight, cyanogen content and yield.

Table1. Estimates of mean and coefficient of variation for 10 characters in indigenous accessions:

Sl.No	Character	Mean	PCV%
1.	Tuber yield(kg/plant)	1.70	55.8
2.	No. of tubers/plant	4.40	44.8
3.	One tuber wt(kg)	0.50	48.5
4.	Length of the tuber (cm).	24.85	34.28
5.	Girth of the tuber(cm)	14.58	18.28
6.	Starch per cent	27.80	17.80
7.	Cyanogens (ppm/g)	40.68	64.80
8.	Height of the plant	108.20	27.25
9.	No. of branches	4.80	38.28
10.	Weight of the shoot(kg)	2.50	68.80

Fig.3. RAPD pattern in Variety-1(20 OPQ Primers)

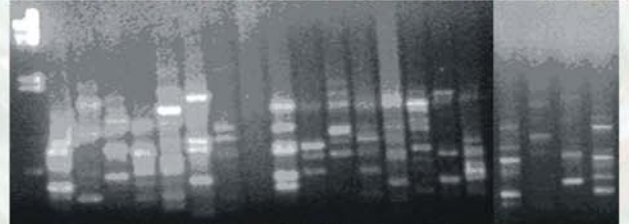
M 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20



The banding pattern showed high polymorphism

Fig. 4RAPD Pattern in Variety -2 (20 OPQ Primers)

M 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20



- Dendrogram analysis showed that Similarity Index among distinct varieties from 90 to 25.

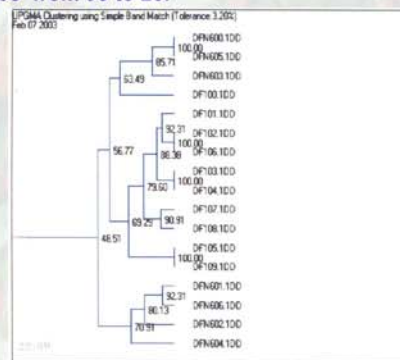


Fig.5. Dendrogram based on RAPD (Part of Graph)

- The results showed high variability for morphological and yield characters as well as molecular markers.
- The similarity between the most divergent varieties is as low as 25 units.
- This diversity is the outcome of natural cross pollination and selection by farmers.
- Spontaneous polyploids also occur occasionally (Santha V. Pillai *et al.* 2003)
- Bud mutation for single character, especially tuber colour is very common in cassava (Tuber colour is very important as the favorite colors fetch more price in the market).
- Evolution of varieties
A critical examination of the varieties, over the decade, showed that the earlier varieties were bitter in taste. Farmers select the varieties for low cyanogen content, good cooking quality, high dry matter and earliness, in addition to high yield. The natural hybrids, evolved after the introduction of the sweet variety M4 have good cooking quality. During the last decade the selection was for early maturing varieties.

Fig.6. Early maturing accession



- Resistance to mosaic disease is not given much importance in farmers' selection.

Conclusion

- Southern part of India, which shares similar agroclimatic conditions with South America, is a 'good breeding ground' for Cassava.
- Some of the wild species like *M. glaziovii* have established well in this region.
- As such, South India can be called a 'Secondary Centre of Origin of Cassava', as is the case with Africa (Lefvre and Charrier, 1993).

Reference

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