PROGRESS TOWARDS INCORPORATION OF RESISTANCE TO CASSAVA MOSAIC DISEASE FROM EXOTIC GERMPLASM TO CULTIVATED VARIETIES IN INDIA.

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INTRODUCTION

Cassava mosaic disease has become a major problem in India where the crop is cultivated regularly in the states of Kerala and Tamil Nadu.Field screening carried out during the previous years has lead to the identification of Mnga 1, an exotic line received from CIAT, Cali, Colombia (received as *in vitro* cultures) in 1994 as having resistance to the disease. Studies were conducted to confirm the stability of this character in different locations and crop seasons as well as to breed CMD resistant lines using MNga 1 as source parent. The progress made towards using this exotic germplasm for direct utilization as well as a pre-breeding material for disease resistance is reported.

MATERIALS AND METHODS

Field screening of different varieties was conducted in heavily infested field (50 to 100%) continuously for 8 years and disease incidence recorded. Graft testing was done by wedge grafting the test scion to susceptible, symptom expressing stock. The resistant variety, MNga 1 was subjected to field screening in Kerala as well as in Tamil Nadu in 6 locations: yield and tuber characters were studied along with other lines in replicated trials (RBD, replication 3, plot size: 16 plants) for 6 years continuously. Tuber dry matter, starch and cyanogen content also were studied as well as flowering and seed set. MNga 1 was crossed with Sree Jaya (CI 649), Sree Vijaya (CI 731), Sree Rekha (TCH 1), Sree Prabha (TCH 2), 4 released varieties and 2 popular indigenous varieties, CI 732 and CI 848 in 10 different combinations. Crossed as well as open pollinated seeds (parent lines) were collected and full sib and half sib seedling progeny raised. The seedlings were subjected to field screening by transplanting them in a heavily infested (65%) plot. CMD symptom expression was recorded routinely at seedbed, 3rd month, 6th month and 10th month growth when harvesting was conducted. Tuber characters of seedling progeny was recorded. Scoring was done for resistant plants expressing no disease symptom as well as mildly resistant types showing reversion symptoms. First clonal progeny of the selections was raised in field and subjected to field screening. Selections made were subjected to graft testing for confirmation of resistance.

Resistance (CMD) breeding in Cassava: Intervarietal ,Source: MNga-1 (TMS 30001) from IITA, Nigeria through CIAT, Cali, Colombia 2002-2003

No of pollinations made : 3,045 No of seeds collected : 1,243 **Total**
No of capsules set : 2,633 Open pollinated seeds collected : 3,340 **4583**

No of seeds (Sprouted)

Open pollinated : 1260 Crosses : 783 **Total : 2,043**

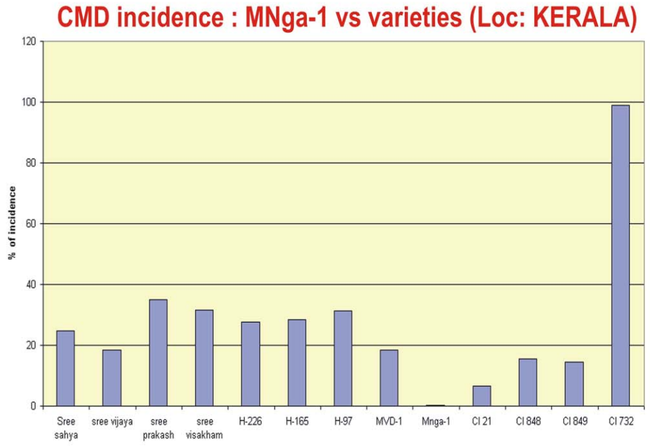
No of seedlings transplanted and established

Pollinated (Full sib) : 526 Open pollinated (Half sib): 920 **Total:1,446**

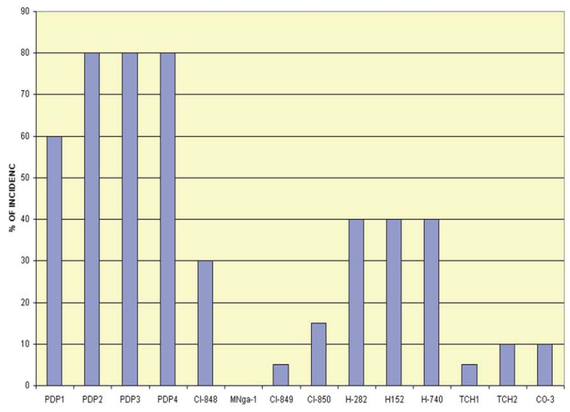
RESULTS AND DISCUSSIONS

Field screening conducted for 8 years at CTCRI, Trivandrum showed 0 to 0.1% CMD symptoms in MNga-1 and 0% incidence in Tamil Nadu in all locations while all the other lines showed 7 to 99% (7% in CI-21 and 99% in CI-732) disease incidence. Evaluation studies conducted at CTCRI showed 25-30 t/ha-tuber yield, 31 to 37 % dry matter, 25-27% starch and 37 to 40 µg/100g cyanogens. The resistant character was further confirmed by graft testing when the MNga 1 scions did not develop CMD symptom on symptom expressing infected stalk of variety Sree Jaya. This exotic accession was found to flower and set seed under the environmental conditions of the studied locations.

CMD incidence : MNga-1 vs varieties (Loc: KERALA)



LOC : TAMIL NADU



Among the 10 different crosses made with the 6 varieties 17-74 % seed set and 46-87% seed germination was obtained. 1419 seedling plants were transplanted which included 475 full sib progeny and 944 half-sib progeny. Higher number of symptom free plants was obtained in half sib progeny of MNga 1 (79.8%) than in the full sib progeny (31 to 49%).

CMD resistant plants isolated based on symptom

Resistant			Reversion			
Full sib	: 97	Total	Full sib	: 82	Total	**Total :704**
Half sib	: 384	481	Half sib	: 141	223	

CMD incidence in seedling population

a. Seed bed

MNga- cross		37.03
MNga 1	OP	15.70
Sree Rekha	OP	21.30
Sree Prabha	OP	23.00
Sree Vijaya	OP	34.30

b. Expression of resistance (In field)

	Mean	Range
VG	30.83	25-36
GV	49.1	25-62.5
GJ	36.4	16.7-58.3
PG	43.7	33.3-57.1

Variation was observed among the different crosses in the expression of the resistant character, which ranged from 31 to 56% symptom free plants. Out of 1419 plants subjected to field screening, 704 were primarily selected as resistant for clonal evaluation. About 481 selections (97 full sib and 384 half sib) were found symptom free throughout the screening period. Two twenty three selections (82 full sib and 141 half sib) showed mild symptoms at early stage which disappeared at later stage, indicating reversion types having mild resistance as was observed in the case of studies on African Cassava Mosaic resistance studies (Alicai *et al*, 2001). Field screening of 1st clonal generation of the selections is in progress. Out of 115 clonal lines so far subjected to graft testing 96 have been found resistant.

CMD resistant genotype MNga-1

MNga: 1 derived progeny - Variation in resistance and shoot and root characters

CONCLUSION

- MNga 1(TMS 30001) is resistant to the cassava mosaic disease in India
- This exotic line is having normal tuber yield, dry matter, starch and low cyanogen content
- MNga 1 shows normal flowering, seed set and is easily crossable with the local varieties in India
- The ratio of resistant and susceptible plants among the population studied showed 1:1 segregation

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