

Ensuring virus-free banana germplasm for long-term conservation & dissemination

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Plant genetic resources conservation is an essential component in meeting the demand for future food sustainability and security. With the advancements in biotechnology, techniques like *in-vitro* culture has made it possible to collect and preserve plant materials for conservation and dissemination. The Institute of Plant Breeding - National Plant Genetic Resources Laboratory (NPGRL), as the national repository of important and potentially useful agricultural crops, holds the duplicate collection of Southeast Asian banana germplasm and maintains the world's largest collection of the wild *Musa balbisiana*, *in-vitro* and *in-vivo*.

In the Philippines, the most important constraint in field genebank conservation is infection of virus diseases. *In-vitro* conservation offers a safer technique of maintaining germplasm free from virus infection.

Another method being tried at NPGRL is conserving the accessions inside an insect-proof screenhouse to keep out the vectors from transmitting the virus. In order to ensure that the duplicate collections are virus-free, the accessions are first virus-indexed before these are established for *in-vitro* & screenhouse conservation. Virus indexing has now become an integral part of standard protocol in banana conservation. Diagnostic tool like the Enzyme-Linked Immunosorbent Assay (ELISA) has proved to be sensitive, efficient, and practical in detecting the presence of viruses both in *in-vitro* seedling and in the field banana collections. The technology is now also being availed by private or government institutions involved in banana tissue culture mass production industry.

RESULTS & DISCUSSION

A. Virus indexing of introduced & locally collected banana cultivars for *in-vivo* & *in-vitro* conservation & dissemination.

Table 1. Virus indexing of 29 banana cultivars at repository, IPB for banana germplasm collection & dissemination from 2006-2008.

No.	BANANA CULTIVARS	# of plants	ELISA (BBTV & CMV)		
			2006	2007	2008
1	Quarenta Dias	3	-	-	-
2	Cardaba	3	-	-	-
3	LKD	3	-	-	-
4	FHIA 25	3	-	-	-
5	FHIA 23	3	-	-	-
6	FHIA 21	3	-	-	-
7	FHIA 18	3	-	-	-
8	FHIA 17	3	-	-	-
9	FHIA 2	3	-	-	-
10	FHIA 1	3	-	-	-
11	TMB x 1378	3	+ BBTV	-	-
12	Latundan	4	-	-	-
13	SH 3436-9	4	-	-	-
14	OT 219	3	-	-	-
15	FHIA 3	3	-	-	-
16	Lak-Tag	3	-	-	-
17	Sen-Tag	3	-	-	-
18	AACV Rose 1	1	-	-	-
19	GCTCV 247	1	-	-	-
20	William	2	-	-	-
21	GCTCV 119	2	-	-	-
22	G-106	3	-	-	-
23	Bungulan	3	-	-	-
24	Cavendish	2	-	-	-
25	Cachaco	1	-	-	-
26	KM 25	4	-	-	-
27	Gros Michel	4	-	-	-
28	Pisang Ceylan	3	-	-	-
29	Lak-Cav	3	-	-	-

- 1 out of 3 plants of TMB x 1378 was positive to BBTV as indexed through ELISA. The plant was discarded to prevent the spread of the virus.
- To date, 76 introduced & local cultivars were indexed & found negative to *Banana bunchy top* (BBTV), *Banana bract mosaic* (BBrMV), and *Cucumber mosaic virus* (CMV). Most of these cultivars are now conserved *in-vitro* in the repository (NRMDC) and in the field genebank.
- Collection of wild *Musa balbisiana* was also assessed for the presence of BBTV (0%), BBrMV (91.67%), and CMV (22.22%).

- Virus indexing technology at IPB is also being availed of by other institutions involved in banana tissue-culture industry at a very low cost.

METHODOLOGY

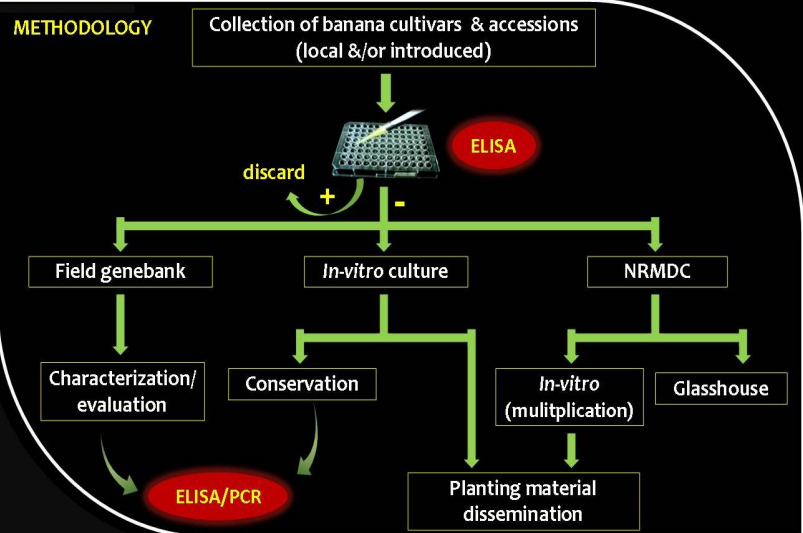


Figure 1. Banana cultivars conserved in (a) *in-vitro* & (b) field genebank at IPB.

B. IPB as the National Virus Indexing Center (NVIC)



Musa virus indexing training workshop

IPB National Virus Indexing Center (NVIC)



- designated by Bioversity International as the center for the virus indexing activities for *Musa*.

aims to optimize & standardize protocol in the detection and diagnosis of virus diseases of banana and other *Musa* sp.



CONCLUSION

- ELISA proved to be very efficient in the early detection of the virus infection. This eliminated the incidence of virus disease on the germplasm collection and planting materials ensuring virus-free stocks. Importantly, virus indexing reduced the cost of banana *in-vitro* & *in-vivo* conservation and dissemination by serving as a measure to prevent virus disease.