

BANANA CHARACTERIZATION AND PAPGREN TRAINING MEETING QDPI, South Johnstone, Australia 28-30 July 2008

Introduction

The July 2008 workshop was a follow up to the planning meeting held back-to-back with the 2007 PAPGREN meeting in Fiji. This report documents what was agreed at that workshop as well as the activities and discussions from the July workshop. At the November meeting each participant presented the contents, activities and issues concerning their national collection(s). The constraints and needs of collections were summarized, and within small group consultations, ideas proposed as to how the different challenges could be addressed. From these discussions a strategy was developed, which presents an element of the Global System for the conservation of banana.

November 2007 meeting: Elements of the Strategy

Collecting

Several countries identified the need for collecting missions in areas believed to contain unique diversity either currently absent from formal or community collections, or under severe risk of being lost as a result of market influences, pests and diseases, and changing cultural habits.

Conservation

National field collections in the past have been vulnerable to severe losses as a result of changing commitments from donors, governments and supporting institutes, as well as the effects of pest and diseases and limited resources (human and financial). The main purpose of national collections has been identified as the supply of planting material to growers. For this reason national institutes may not be best-positioned to guarantee the long-term conservation of accessions for which little interest exists amongst farmers. Several components of conservation need addressing, namely safety duplication, rationalization and characterization.

With this in mind the following components were proposed for the Pacific banana strategy:

- All *probably unique* accessions (see previous definition) in national collections are provided to the SPC for conservation *in vitro*, for virus testing and for general dissemination
- All *probably unique* accessions in national collections provided to SPC are cryopreserved – currently only ITC has good acceptable protocols for banana

- Countries can maintain national collections of their choosing. These can be core collections (about 20% of the total collection including the most popular, most genetically representative, most agronomically interesting, whatever is the decision of the country).
- A regional genebank is established – the purpose of which is for evaluation, in depth characterization, other comparative research, training and a site for field verification and replacement (regeneration) of the *in vitro* collections of ITC and SPC
- Countries, with support from PAPGREN, should encourage and support the development of a network of community-based collections
- Wild species should not be forgotten. These are less suited to genebank conditions and are more suitable for conservation in botanic gardens, also serving as a tool for public awareness and education.

Providing access to clean planting material

A number of banana diseases, black leaf streak, banana bunchy top virus and Fusarium wilt race 4, are present to varying degrees in different islands. Nematodes are a persistent problem throughout the region. Only PNG has sent materials to ITC, and so can access virus tested material. To address this need, the following measures are proposed:

- SPC facilitates the virus testing of the Pacific core collection (combination of unique accessions) through QDPI. 70 of these will be sent, once identified as free of known viruses to ITC.
- SPC staff will undergo training in the PCR methodology for virus testing bananas. Once this has been achieved to the acceptable standard, SPC can within the limits of available resources, virus test material for countries. This “clean” material can then be multiplied for dissemination back to the countries, if they request.
- Collections, institutes and farmers should be trained in alternative field methods for multiplying germplasm, for example the PIF method from Cameroon, and for eliminating pests and diseases (heat treatment/sterilizing with chlorine, selection of clean planting material, replanting every two years, removal of unclean materials)
- Awareness raising at all levels on pest and disease risks and the measures that should be used to avoid them

Sharing germplasm

Four of SPC member countries have ratified the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Others have made significant progress towards ratification. Yet there still remains a limited understanding of the MLS and how it works and the conditions to which countries must adhere to, once they have ratified the Treaty. The following activities are proposed to address these gaps;

- Develop awareness and capacity in this area. Ensure information is available and support is provided so that Island governments can make informed decisions with regards to the ITPGRFA
- Ratification by all SPC member countries

Providing information

The availability of characterization data on banana genetic diversity in the Pacific is limited in quantity and quality. A significant and coordinated effort is required to improve the information available on Pacific bananas from the gathering of data to its publication and dissemination. The following is proposed:

- Use of common (minimum) descriptor lists with standard protocols for field experiments, and the use of reference accessions for comparison and training.
- Agree on the software/databases for managing data – is the adapted version of MGIS suitable?
- Share documentation – use of MusaLit
- Develop a Musalogue or similar publication to describe Pacific banana and their attributes and uses
- Establish an email group for discussions/sharing information and data. This could be through PAPGREN

Implementing the Strategy

Through the Global Crop Diversity Trust, funding is being made available to the region and to individual collections to implement activities which will eventually contribute to the Pacific banana collection. The funding is conditional on the agreement that germplasm is placed in the public domain under the conditions of the Standard Material Transfer Agreement (SMTA) as used by the Treaty.

The implementation of the strategy and the development of the Pacific collection consist of the following steps/activities:

- Training event in 2008 using a large field collection to focus on morphological characterization and genebank management. Characterization will involve the use of minimum descriptors and photo guidelines – with a merging of the two where possible. Participants will be provided with a digital camera to facilitate follow up after the course.
- Trainees from the course will characterize, photograph and document their collections with the aim of identifying the “unique” accessions for a regional core and also where relevant accessions for a national core.
- “Unique” accessions will be sent to SPC, either as tissue cultures or disinfected sucker pieces for establishment in tissue culture and eventual virus testing by QDPI. All or some (a subset) will be made available to a regional field collection, and ITC for cryopreservation and exchange
- Some countries, for example PNG and possibly Solomon Islands, will be provided with support to relocate and regenerate their collections

July 2008: Training workshop

Introduction

The workshop was open to all PAPGREN focal points as even though they are not all curators of banana collections, bananas are very important in all the Pacific Island countries. Some countries such as Vanuatu and Palau indicated their intention to undergo collecting and to establish a national collection. In addition the procedures followed and the techniques involved in characterizing a banana collection are similar to those used with other crops.

The workshop was held at the QDPI South Johnstone Station. 15 participants, (7 women, 8 men) representing 13 Pacific Island countries attended the three day workshop, which consisted of lectures and practical hands-on session. The aim of the workshop was to provide the necessary skills with which the participants could characterize the bananas in their national collections. Participants were briefed in the use of photos for identification and introduced to the concept of minimum descriptors. To facilitate the use of the photo guidelines, all participants were provided with cameras.

Workshop topics

The focus was on the unique Pacific bananas – Fei, Maoli, Popo’ulu and Iholena. The following topics were covered:

- The basics of identification
- Minimum morphological descriptors – how to go about measuring/distinguishing these and taking appropriate photos to augment them
- Distinguishing Maoli, Popo’ulu, Iholena and Fei.
- Learning to use the camera
- Using cameras in the field to record minimum descriptors
- Pest and disease issues – to include field identification
- Banana genebank management
- MGIS – the database
- Germplasm exchange – ITPGRFA, SMTA
- MusaNet and the global conservation strategy
- Pacific banana strategy

There was also a session devoted to PAPGREN activities during which Tevita Kete, PAPGREN Coordinator provided updates of all the NZAID funded activities and countries gave updates of their activities and progress towards Treaty ratification (except for the 4 that have already ratified)

Discussion – issues

Community genebanks were discussed as an important component of a complementary conservation strategy for banana conservation in the Pacific, especially for the larger countries, and those that consist of a significant number of islands. Trust funding would not support this mode of conservation so other sources of funding would have to be explored. There is work ongoing in the region which shows how effective this system can be, namely in Vanuatu, Papua New Guinea and Solomon Islands.

The level of banana conservation that exists in the countries varies significantly with the countries. Some countries have significant collections which are well-characterized, others have no collections as such, though it is accepted that significant diversity exists in these countries. So the needs vary with each country. There is no doubt that there is an urgent need to collect, especially in Solomon Islands and Vanuatu. The work carried out by Jeff Daniells and Lois Englberger with the banana collection in Makira, provided a good indication of the diversity that exists in the Solomon Islands. The Trust funding does not support collecting missions, so funds from a different source will have to be located for this need.

The problem with offtypes was discussed as probably with banana, more than any other crop the issue of offtypes as a result of tissue culture is well-documented. Having said that the International Transit Centre (ITC) followed up on their distributions and found there were in fact very few offtypes recorded, and similarly SPC in the distribution of bananas throughout the Pacific have also had no reports of offtypes, except for a recent consignment to Kiribati where possibly 4 out of 4000 were offtypes. A publication on banana offtypes is available and has been transferred to the CD which all participants will be receiving.

Nutritional analysis is becoming increasingly important in the analysis of any collection of many of the major staple crops of the Pacific. The work carried out by Lois Englberger on bananas, swamp taro and pandanus has highlighted the contribution that diversity can make to improving nutrition and therefore health. The procedures required to successfully analyze samples for selected nutritional factors, such as beta-carotenes are not easy to implement especially in the Pacific, where samples have to be transported distances, thereby making the maintaining of the sample in a frozen condition, problematic. There is one lab in the Pacific that does carry out food analysis and the cost is not cheap if there are large numbers of samples. This issue of how to best facilitate nutritional analysis has to be looked at more closely. Can we have another lab in the region that can do this analysis – would it be worth the investment? Is it possible to develop any “quick tests”, even if only at a screening level? Can we negotiate with USP a cheaper rate? In the meantime we have to do the best we can and with that in mind DSM Yolk Colour Fans are being provided with the CDs of the workshop presentations.

The Trust supported project is quite complicated in that deadlines have already been put in place for the provision of bananas from the countries, yet the countries themselves have yet to really look at, and analyze their collections. There was some discussion of what the national collections could provide, with New Caledonia and French Polynesia being the most able at this stage to give a relatively clear indication of what could be provided. The deadlines set by the Trust require that 70 accessions from the countries are with SPC by April 2009 and 100 accessions by April 2010.

Next steps

As agreed at the workshop the countries who are participating in this Trust supported activity will have to make decisions as to what accessions they wish to contribute to this Pacific collection. The focus is on the Maoli, Popo'ulu, Fei and Iholena types. Jeff and Angela can assist with identification etc. This is where the cameras come in useful and also the photo guidelines provided by Angela, as you can send photos to them.

Anne Vezina has recently been in contact with you regarding both the number of accessions that you would like to send to the SPC and any specific needs you would like to be addressed as part of the project.

One thing to remember is that the funding from the Trust requires that you agree to share the accessions you provide and for this the Solemn Undertaking has to be signed.