

**Memorandum of Project Formulation Meeting  
for “Disease Resistance in Banana”  
-FNCA Mutation Breeding Project-**

**September 29-30, 2003  
Manila, the Philippines**

On September 29 and 30, 2003, the Program Formulation Meeting was held in Manila, the Philippines on “Disease Resistance in Banana” under the framework of FNCA Mutation Breeding Project. Project Leaders and specialists from five countries, i.e. Indonesia, Japan, Malaysia, the Philippines and Vietnam attended the Meeting, and discussed how to organize the research work effectively.

Dr. Desiree M. Hautea of the Institute of Plant Breeding, UP Los Banos, presented the paper “Status of banana R&D in the Philippines” and also agreed to participate in this new project.

In the Meeting, the present status of banana breeding research was presented by each country. The summary of each country report is as follows,

**Indonesia:**

Two main diseases have decreased banana production in Indonesia. These diseases are *Fusarium oxysporum* *fp. cubense* and banana blood disease (BBD). Mutagenesis is considered as appropriate alternative method to induce resistance. Tissue culture has been initiated on banana cv Pisang barangan and Pisang tanduk.

**Malaysia:**

Collaborative research efforts in Malaysia between research institutions, universities, private sectors and international agencies have produced varieties with improved agronomic characters and developed useful techniques. It is proposed that similar project is undertaken to develop *Fusarium* resistant varieties for Pisang berangan (AAA) and Pisang rastali (AAB) by mutation induction and also utilizing the resistant traits found in wild banana.

**The Philippines:**

The report presented a brief overview of the banana industry in the Philippines and the status of banana R & D activities in crop improvement for resistance to banana diseases. The Philippines is one of the top ten producers and exporters of bananas in the world. The banana industry is central to the economy of the Philippines. It is one of the top export earners, the source of livelihood of 75% of small-scale banana farmers and contributes to nutrition of 73% of the 80 million Filipinos. Although banana production has been increasing over the years, the yield has remained below the world’s average because of production constraints primarily due to pests and diseases and post-harvest losses. Virus diseases particularly banana bunchy top virus has caused

production losses as high as 100% especially in small-scale banana farms. Resistant sources are not available and hybridization in banana has been extremely difficult due to sterility and polyploidy. Thus, current efforts in banana improvement have focused on the use of non-conventional technologies like mutation breeding, tissue culture and transformation. The accomplishments and future plans of these on-going researches were discussed.

#### **Vietnam:**

The report indicated the importance of banana in the farming system, and presented an overview of research on banana pests and diseases. A total of 26 major banana diseases were identified, consisting of 3 viral diseases, 17 fungal diseases, 1 bacterial disease, 1 nematode disease and 4 other diseases. The isolates of 42 FOC collected from 7 provinces (and cities) in the north of Vietnam belong to Race 1 (VCGs 0124, 0124/5, 0125). So far, Race 4 has not been detected in Vietnam. The Cavendish group (AAA) has not been infected by FOC yet. For these reasons, Vietnam is participating in the FNCA Banana Project for banana improvement on BTV and FOC disease resistance.

The goal of this cooperative work is to acquire the resistant mutant lines to the specific Fusarium and virus diseases. Furthermore, other outcomes expected from this work, are to isolate the genes related to the disease resistance and to analyze the role of genes if the favorable mutants could be obtained.

This FNCA project complements the IAEA Project on Banana, through exchange of information and enhancement of regional cooperation between participating countries.

Malaysia accepted to be the leading country in this research work and propose this cooperative program to the coming FNCA Coordinators Meeting in Tokyo.

On the second day, the participants visited the Institute of Plant Breeding (IPB), UPLB. The participants were briefed on the current researches on banana breeding and visited the germplasm collection, field evaluation of FHIA hybrids and local cultivars, biotechnology, tissue culture and plant pathology laboratories. All the participants expressed their sincere gratitude to the staff of UPLB.

After the presentation of the present status of banana breeding research, the details of this project were discussed and decided as follows:

**Participating Countries:** Indonesia, Malaysia, the Philippines, Vietnam and Japan

**Mutation Induction:** gamma rays

**Objective Plant:** Banana (Malaysia-Pisang berangan and Pisang rastali; Indonesia-Pisang barangan and Pisang tanduk; Vietnam-chuoi tay and chuoi tieu; the Philippines- lakatan and latundan)

**Target Diseases:** *Fusarium oxysporium* f. sp. *cubense* (race 1 and race 4), (Vietnam, Malaysia, the Philippines and Indonesia)

Virus sp. banana bunchy Top virus (BBTV), (the Philippines and Vietnam)

Banana Blood Disease (BBD) (Indonesia)

**Working Periods:** FY2004 - FY2008

### **Working Plan of MRP-3 “Disease Resistance in Banana”**

<b>FY 2004</b>	<ol style="list-style-type: none"> <li>1. Induction of embryogenic callus from male inflorescence or other explants</li> <li>2. Optimisation of regeneration frequency from embryogenic callus</li> <li>3. Determination of optimum dose for embryogenic callus</li> <li>4. Validation and characterisation of base line information of pathogen</li> <li>5. Annual meeting</li> </ol>
<b>FY 2005</b>	<ol style="list-style-type: none"> <li>1. Irradiation of materials (I)</li> <li>2. Regeneration and selection of plantlets from irradiated materials (I)</li> <li>3. Micropropagation of selected mutant lines (I)</li> <li>4. Induction of embryogenic callus from male inflorescence or other explants (II)</li> <li>5. Optimisation of regeneration frequency from embryogenic callus (II)</li> <li>6. Annual meeting</li> </ol>
<b>FY 2006</b>	<ol style="list-style-type: none"> <li>1. Irradiation of materials (II)</li> <li>2. Regeneration and selection of plantlets from irradiated materials (II)</li> <li>3. Micropropagation of selected mutant lines (II)</li> <li>4. Field evaluation of material (I) against target diseases</li> <li>5. Annual meeting (Mid-term Report)</li> </ol>
<b>FY 2007</b>	<ol style="list-style-type: none"> <li>1. Field evaluation of material (II) against target diseases</li> <li>2. Performance evaluation of selected resistant/tolerant lines (I)</li> <li>3. Annual meeting</li> </ol>
<b>FY 2008</b>	<ol style="list-style-type: none"> <li>1. Performance evaluation of selected mutant resistant/tolerant lines (II)</li> <li>2. Annual meeting (Final Report)</li> </ol>