

BANANA IMPROVEMENT THROUGH GAMMA IRRADIATION AND TESTING FOR BANANA BRACT MOSAIC VIRUS IN SRI LANKA

HIRIMBUREGAMA, W.K., W.K.G. DIAS, K. HIRIMBUREGAMA

Department of Botany
University of Colombo
Colombo 03
Sri Lanka

Abstract

Banana is the most widely consumed fruit in Sri Lanka, and is an attractive perennial fruit crop for small farmers. This is due to its high economic gains throughout the year compared with rice. Lowland rice fields have been converted for banana cultivation. Among the local cultivars, Embul (Mysore, AAB) is in the highest demand for cultivation. Since 1990, the University of Colombo has carried out research on bananas, including micropropagation through shoot-tip culture, gamma radiation-induced mutations, cell-suspension cultures and somatic embryogenesis, and ploidy analysis for detection of variation.

Since 1995, investigations have been conducted to improve both Embul and Cavendish banana cultivars. Two selections of banana have been made for early fruiting and short height. Micropropagated plants of the selections were tested for trait stability until the second generation. Mass production of plants is in progress. Thus, indexing and testing of plants for viruses, i.e. BBrMV and BSV, has become essential, since virus-free indexed mother stocks are required for micropropagation. Techniques were adopted for routine testing of mother stocks, and random testing of micropropagated plants for BBrMV by DAS-ELISA with imported commercial kits.

The present study was aimed at the development of a low-cost ELISA detection kit. Anti-serum for BBrMV, produced by the Queensland Department of Primary Industries (QDPI), Australia, was tested as the coating antibody to replace the Agdia commercial kit. Results showed a relatively high efficiency with the QDPI antibody. Work is also in progress to make an alkaline phosphatase-conjugated antibody to replace the test kit. With the production of local antiserum, it is expected that an effective low-cost local diagnostic kit could be developed for the routine indexing of banana plants for BBrMV. This would facilitate the identification of virus-free mother stocks for micropropagation. However, purification of the virus extract is still a limiting factor for obtaining the antigen.

Abbreviations: BBTV, Banana Bunchy Top Virus; BSV, Banana Streak Virus; BBrMV, Banana Bract Mosaic Virus; CMV, Cucumber Mosaic Virus; ELISA, Enzyme Linked Immunosorbent Assay; OFC, Other Food Crops; QDPI, Queensland Department of Primary Industries

1. INTRODUCTION

1.1. Importance of bananas in Sri Lanka

Banana (*Musa* spp.) is the most widely cultivated and consumed fruit in Sri Lanka. It is also an attractive perennial fruit crop for farmers due to its high economic gains throughout the year. Even rice fields are being converted to grow banana, as it gives more economic benefits, requires relatively less water [1] and less input than rice, and gives higher returns than rice. The farmer's net profit has gone up about four times compared with rice. In addition, not only is there water saving from banana cultivation, but also the nutritional level in farmers' families has improved due to the habit of increased fruit consumption. Also, there is a reduction in the use of chemical pesticides in banana cultivation, which has a positive impact human on health and the environment. Banana has been given the highest priority amongst Other Food Crops (OFC). Out of the 28 local cultivars, the cultivar Embul (Mysore-AAB) is in the highest demand. Kolikuttu (Silk-AAB) and Ambon (Cavendish-AAA), grown especially in the mid-wet zone of the country, are also in considerable demand.

Currently, nearly 50,000 ha of land is under banana cultivation in Sri Lanka, and the annual banana production is around 450,000 metric tonnes. Until recently, banana cultivation was limited to very small plots, but now large fields are being established. More and more rice