

## **Towards improvement of *Musa* species through *in vitro* manipulations**

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**Keywords:** cv *Spambia*, genetic transformation, embryogenic cell suspensions, herbicide resistance, somatic embryogenesis

### **Abstract**

Banana and plantain (*Musa* spp.) are among the most nutritious fruit crops in the world with annual production of around 100 million tons. Due to the problem of sterility and polyploidy, improvement of banana through conventional breeding against a number of virulent diseases and pests has been limited. Combined techniques of tissue culture and molecular biology hold the key to overcome these problems. Somatic embryogenesis is considered as a pre-requisite for genetic engineering for improvement of banana. Embryogenic cell suspensions of banana have been successfully initiated from proliferating meristems, immature male and female flowers, immature zygotic embryos, corm tissues and leaf bases, and protoplasts. Despite these successes, there are still many constraints in the reproducible and efficient regeneration of banana and plantain. Amongst these bottlenecks are the poor embryogenic response, as in East African Highland banana, the low frequency of plant recovery, the labor and time consuming preparation phase. To date, there are only a few published reports on somatic embryogenesis from plantain. Somatic embryogenesis from proliferating shoot tips would prove to be superior for large scale plantain propagation since these are not subjected to seasonal variation as is the case with the male flowers. We have established an efficient system of regeneration from cell suspension cultures from the shoot tips of the *Musa* cultivar *Spambia* (AAB). The conducive effect of specific growth regulators in maturation of somatic embryos of *Musa* spp. that later enhances the plantlet recovery has been demonstrated for the first time. This regeneration system has also been used successfully for genetic transformation with a herbicide resistance gene. The transformation system established can further be used for genetic improvement of *Musa* species and large-scale propagation of plants. The work in our laboratory is also being carried for developing transgenic *Musa* species for abiotic and biotic stress tolerance as well as for improvement of nutritional quality.

## **Establishment of virus-free banana mother stock for production of certified banana plants and virus tested tissue culture seedlings**

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**Keywords:** BSV, *Musa*, PCR

### **Abstract**

**Banana is one of the most widely consumed fruit, and an attractive perennial fruit crop for small farmers in Kenya. However, viral diseases such as banana streak virus (BSV) have contributed to the poor performance of banana seedling production. Knowledge of the prevailing BSV isolates in the country and establishment of virus indexed banana plants is therefore important since virus-free indexed mother stocks are required for micro-propagation. The present study was aimed at screening for BSV in the five commercial banana cultivars and establishment of vigorous virus-free mother stock for future supply of certified banana suckers. IC-PCR technique was used to identify presence and type of isolates in each of the tissue culture seedlings of banana cvs. FHIA 17, FHIA 18, Chinese Cavendish, Solio and Nusu Ng'ombe before field establishment, and one month and six months after their establishment in the field orchard. Results showed variation in severity of infection among cultivars in the greenhouse before field establishment with 58% infection for FHIA17, 48% for FHIA18, 41% for Chinese Cavendish, and 6% for Solio and Nusu Ng'ombe. One month after establishment of virus – free material, there was 10% infection detected in the first three cultivars. These results confirmed that plant tissue alone is not efficient in elimination of BSV and there is need to index all plants before and after establishment routinely. After six months in the field further molecular screening confirmed infection in 55% of the 200 samples tested using three primers BSV-GF, BSV-Cav and degenerate primers Badna 1A-4'.**

## **Assessing the impacts of banana bacterial wilt disease on banana productivity and livelihoods of farm households in Uganda**

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**Keywords:** participatory development communications, xanthomonas wilt, BXW

### **Abstract**

**Banana *Xanthomonas* Wilt (BXW) disease was discovered simultaneously in Uganda and the Democratic Republic of Congo in 2001 and shortly thereafter in 2002 in neighboring Rwanda. In Uganda the disease was first seen in the central region where the ABB bananas dominate the cropping system. Subsequently the disease spread into other regions in Uganda and into Kenya and Tanzania. A collaborative study was carried out in four districts in central Uganda to establish the factors contributing to the epidemic, to assess the impact of the disease on banana yield and to evaluate the impact of a campaign on disease management. On average, 33% of the total banana mats were infected with BXW between 2001 and 2004. None of the banana types was resistant to the disease. However, AAA-East African highland cultivars were significantly less affected than the AAB and ABB types. The results showed that participatory development communications (PDC) campaign against the disease had had substantial impact on reducing disease incidence. Compared to pre-infection levels, the total banana yield loss due to BXW infection was estimated at 30–52% between 2001 and 2004, hence a reduction in the amount of bananas harvested by farm households. This in turn had negative livelihood impacts. Consumption of own-produced bananas, sale of bananas, prices received, and farm and total household incomes were substantially lower among BXW-infected farm households than their non-infected counterparts. For those other affected farm households that had little or no opportunities outside banana production, other interventions in addition to the educational campaign on controlling the disease would be required.**