9th International Conference on
Agricultural Biotechnology: Ten Years After
organized by the:
International Consortium on Agricultural Biotechnology Research (ICABR)
and the:
Catholic University of Leuven
CEIS - University of Rome "Tor Vergata"
Centre of Sustainable Resource Development, University of California at Berkeley
Economic Growth Centre, Yale University

Ravello (Italy), July 6-10, 2005

"BIOTECHNOLOGY FOR IMPROVEMENT OF BANANA PRODUCTION IN AFRICA"

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ABSTRACT

Bananas (*Musa* sp.) are a major staple food, supplying up to 25% of the carbohydrates for approximately 70 million people in Africa's humid forest and mid-altitude regions. They are the developing world's fourth most important global food crop after rice, wheat and maize in terms of gross value of production. World *Musa* production is currently about 97 million tones annually, of which bananas cultivated for the export trade accounts for only 10%. Hence, bananas are important for food security in the humid tropics and provide income to the farmers. Many pests and diseases have significantly affected *Musa* cultivation. Black Sigatoka (*Mycosphaerella fijiensis*), Fusarium wilt (*Fusarium oxysporum* f. sp. *cubense*), bacterial wilt

(*Xanthomonas campestris pv. musacearum*), viruses (*Banana bunchy-top virus*, *Banana streak virus*), nematodes and weevils cause significant crop losses worldwide. Bananas are predominantly smallholder crops, and most growers cannot afford costly chemicals to control pests and diseases. As diseases continue to spread, there is a growing demand for new improved varieties. Development of disease-resistant banana by conventional breeding remains a difficult endeavor because of the long generation times, various levels of ploidy, sterility of most edible cultivars, and limited genetic variability. Genetic engineering offers an alternative method for crop enhancement.

Relative success in genetic engineering of bananas and plantains has been achieved recently, enabling the transfer of foreign genes into the plant cells. Genetic transformation using microprojectile bombardment of embryogenic cell suspensions is now routine. The protocol has also been developed for *Agrobacterium*-mediated transformation of embryogenic cell suspensions and apical shoot meristem of various cultivars of banana. The transgenic approach shows potential for the genetic improvement of the crop using a wide set of transgenes currently available which may confer resistance pests and diseases.

Plant biotechnology has the potential to play a key role in the sustainable production of *Musa*. Currently, no genetically transformed bananas and plantains are commercially available; however there is enormous potential for genetic manipulation of *Musa* species for disease and pest resistance using the existing transformation systems. The use of appropriate constructs may allow the production of nematode, fungus, bacterial and virus-resistant plants in a significantly shorter period of time than using conventional breeding, especially if several traits can be introduced at the same time. It may also be possible to incorporate other characteristics such as drought tolerance, thus extending the geographic spread of banana and plantain production, and thus contributing significantly to food security and poverty alleviation in Africa.