



UNTAPPED TREASURES

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BANANAS: AN UNTAPPED TREASURE

The industrialized world started to consume dessert bananas around the 1870s, but the tropical world discovered bananas much earlier, about 7,000 years ago, in their centre of origin in Southeast Asia and the Pacific. The value of bananas in the industrialized world is about US \$8.9 billion. However in the tropical world, where 87% of all kinds of bananas are consumed, production value is estimated at US \$35.2 billion. With 145 million tons produced annually, bananas are the eighth most important food crop in the world and the fourth most important crop among the least-developed countries. Bananas are consumed in 120 different countries, providing a staple food for nearly 400 million people. While the export industry relies on cultivars of one genetically narrow group

(the Cavendish group), over 400 varieties are estimated to be cultivated by smallholders. These farmers grow up to 30 varieties simultaneously in their fields, including a range of starchy bananas that are either cooked (cooking bananas), fermented (beer bananas) or fried and/or roasted (plantain). The flowers are also consumed as a vegetable, and the fibres extracted from the plant can be used as a source for textiles.

Bananas are giant herbs—not trees—hence they grow very fast and decompose rapidly after harvest. They produce year round, thus providing food during the hunger gap when other crops are less available. If maintained properly, backyards where bananas are grown around the house remain productive for 30-100 years. These giant plants reaching a height of three to four meters create a micro-environment, allowing intercropping with up to 60 other food crops. As such, they form the backbone of complex farming systems supporting farmers to obtain a diverse menu under low-risk conditions, while protecting the soil and supporting sustainable production.

Despite increasing global banana production, yields of banana—used here in the broad sense to encompass all dessert and cooking types—are far below their potential. For example, in Uganda where nearly 10% of all bananas in the world are consumed (with an average consumption of 0.5-1 kg per person per day) average yield is at 9% of the yield potential. Production suffers from many biotic and abiotic stresses, such as *Fusarium wilt*, bacterial wilts, nematodes, weevils, black leaf streak, bunchy top, drought and declining soil fertility.

IITA (International Institute of Tropical Agriculture) and NARO (National Agricultural Research Organization, Uganda) have developed a range of 26 high-yielding cooking hybrids (dubbed NARITAs) with the best ones producing five times more than the local cooking banana varieties. Previously IITA already developed 14 superior plantain varieties with a yield increase of 225%. With the release of the genetic code of banana and a better knowledge of diseases and pests, breeding is expected to go faster despite the low seed set after pollinations.

Plantains are rich in provitamin A and hence any new hybrid should at least provide the same levels. Also the natural diversity in the crop can be better exploited. Large-scale screening of over 400 banana varieties by Bioversity International, IITA and their partners has shown that there is substantial variability in the levels of vitamin A precursors in banana varieties, and that the levels in some cultivars are so high that they can contribute to improving the vitamin A nutritional status of banana-dependent populations at modest and realistic fruit consumption levels.

The discovery of provitamin-A-rich bananas, and the use of varieties and wild types with high levels of resistance to pests and diseases in breeding, underlines the importance of diversity. This diversity is being safeguarded for future generations in a global banana collection. The Bioversity International Musa Germplasm Transit Centre (ITC) was established 30 years ago and is hosted at the Catholic University of Leuven (KU Leuven), Belgium. It stores nearly 1,500 accessions in vitro (in test tubes) at 15°C, and 65% of the collection is kept frozen at -196°C. All banana accessions have been indexed for viruses; infected accessions are cleaned and clean materials are made available at a rate of three to five accessions per day. So far more than 80% of the collection has been distributed to more than 100 countries. Users provide feedback on the accessions' performance, thereby providing more and better documentation of the accessions for future applicants.

Documented accessions are also mass multiplied by commercial in vitro laboratories or government institutions and sold or distributed to farmers. For example, in Northwest Tanzania, 24 new varieties were introduced and farmers selected four varieties. These were mass multiplied to six million plants. Yields in the region increased drastically (from <20 kg to >100 kg) and income was raised three times for 0.5 million people. The staple banana crop has now also become a commercial crop, generating income for smallholders. The introduction and use of the top four new varieties also increased the stability of the banana-based farming system. This is in sharp contrast with the monocultures of the export industry, which are now threatened by a new strain of a soil-borne fungal disease of *Fusarium wilt*, causing Panama disease, in Southeast Asia and recently also in Mozambique. This illustrates the importance of quarantine and controlled movement of plant material and people.