

Bikoro, M. 1975. La Technologie de l'extraction de jus de bananes et sa vinification. Doctoral Thesis, Agronomy Department, Gembloux.

Davies, G. E. 1990. Mission Report Uganda (4-7 March 1990). Centre for Development Studies, UFSIA, Antwerp, April.

Eggeling, W. J. 1947. An Annotated List of the Grasses of Uganda Protectorate. Entebbe: The Government Printer.

Gotanègre, J-F. 1983. La Banane au Rwanda. *Cahiers d'Outre-Mer* 36 (144).

Government of Uganda. 1966. *Report on Uganda Census of Agriculture III*.

Government of Uganda. 1989. Revised Terms and Conditions of the Uganda Public Service. *Circular Standing Instruction* 6.

Jameson, J. D. 1952. Bananas. *Record of Investigations* 3, Department of Agriculture, Uganda.

Masefield, G. B. 1938. *The East Africa Agricultural Journal* III (5).

Masefield, G. B. 1944. Some recent observations in the plantain crop in Buganda, *East African Agricultural Journal*, (X), 12-17.

Sebasigari, K. 1986. Morphological Taxonomy of *Musa* in Eastern Africa. in: *Banana and Plantain Breeding Strategies* (Persley G. J. & De Langhe E. A. L., eds.). *ACIAR Proceedings* 21.

Sebasigari, K. & Stover, R. H. 1988. Banana Diseases and Pests in East Africa. *INIBAP Document* 2.

Sebasigari, K. 1990. Principaux caractères de détermination dans la caractérisation morphologique des bananiers triploïdes Acuminata de l'Afrique de l'Est. in: *Identification of the genetic diversity in the genus Musa*. (R. L. Jarret, ed.). INIBAP.

Shepherd, K. 1957. Banana Cultivars in East Africa. *Trop. Agriculture (Trinidad)* 34 (4).

Southwold, M. 1964. Leadership, Authority and the Village Community. in: *The King's Men* (L. A. Fallers, ed), O.U.P.

UNDP/World Bank. 1989. African Economic and Financial Data. The World Bank.

World Bank. 1988. Uganda: Towards Stabilization and Economic Recovery. Washington, D. C.

Acknowledgments

I much appreciate the interest Professor De Langhe of INIBAP expressed in the mission, and his introduction to Dr Andrew Ker of IDRC who provided me with a comprehensive briefing in Nairobi and an introduction to the Working Group on Banana in Uganda. Professor Mukiibi, Secretary for Research, and his colleagues in the Working Group, were generous with their time and facilitated my travel in Uganda. Mr Wilberforce Sakira introduced me to the traditional brewer, who kindly agreed to be interviewed. INIBAP reimbursed in-country costs incurred during my stay at Makerere University.

East Africa

Rapid rural appraisal of highland banana production in Uganda

by P.R. Rubaihayo* and C.S. Gold**

The Highland bananas (AAA), which are grown in Uganda between 1000-2000 metres above sea level, are unique to the East African highland region. They are a staple food for more than 7 million people in Uganda, with about 66% of the country's urban population depending on them.

Banana is the most extensively grown food crop in Uganda, covering more than 1.2 million hectares, producing over 7 million tons annually, and representing nearly 20% of the total world production. It is estimated that the crop is grown by 75% of the farmers on 40% of Uganda's arable land. It is considered a key component of sustainable agricultural systems in densely populated, high rainfall zones where it reduces soil erosion and acts as a principal source of mulch for maintaining and improving soil fertility.

Moreover, compared to other staples, bananas are the most economical source of carbohydrates in terms

of cost per hectare and per ton. An extended harvest period ensures food and income sources throughout the year.

In spite of its importance, Highland banana production has been declining in Uganda. Yields have dropped from 8.42 ton/ha in 1970 to the current level of 5.58 ton/ha. This has led to the replacement of traditional Highland cooking bananas (Matooke) and beer banana (Mbidde) by the hybrid beer cultivars (AB and ABB) which are considered more tolerant to most stresses.

In response to this growing problem, the national banana program has recently undertaken a rigorous, multi-disciplinary rapid rural appraisal (RRA) survey of the Highland banana systems. The RRA has integrated local farmer knowledge with that of the researchers involved in the survey. Its major objectives have been to provide baseline data which will serve to focus research attention on the major banana production constraints.

Knowledge has been gained *inter alia* on the following:

1. Key farming system and market parameters which influence banana

importance, cultivar distribution and productivity levels.

2. Farmer priorities pertaining to the crop and other farm activities.
3. Farmer perceptions of banana production constraints and management options and responses.

The banana-growing region was stratified by ecological zone and level of banana production, and 25 villages were randomly selected across these strata. A semi-structured questionnaire was developed and data were collected through group and key informant interviews, transect walks and visits to farms.

The RRA revealed that the different banana-growing regions of Uganda are characterized by small farms and dynamic cropping systems. Households attend to a variety of needs, including cash and subsistence agriculture, often under conditions of limited land, labor and financial resources. As a result, most cropping systems are complex; as many as 10-15 crops were encountered on a single farm. The crops were mainly intercropped in different combinations.

Intercropping with banana usually occurred in newly planted fields,

* Makerere University, Uganda

** IITA, Uganda

although scattered intercrops at low density under mature banana canopies were observed. Coffee was a common banana intercrop in the coffee-growing areas.

Increasing land pressure is a major concern at the majority of sites; in some cases, farm size has shrunk to less than 2 acres. Farm size and land tenancy exert influence on crop selection. Banana for example is never grown on rented land, which is only devoted to annual crops.

Matooke (cooking banana) was listed as the most important food crop at 12 sites. Matooke had once been the most important food at 6 other sites but production problems such as short plant life, diminishing yields due to pests, diseases and soil constraints, had forced a change over to cassava. Cassava was consequently the primary staple at 11 sites.

Matooke and hybrid beer bananas were also the most important cash crops at 4 sites and 7 sites respectively. In many areas, hybrid beer cultivars are gaining importance because of their apparent tolerance to stress and greater flexibility in bunch size requirements.

Declining soil fertility was considered a primary production constraint for Highland bananas. Farmers reported two dominant soil problems: declining soil fertility, and the presence of acidic soils (lunyo). Most farmers equated soil fertility with land productivity.

In the majority of villages (18), farmers reported a decline in soil fertility. Lack of information on local soil deficiencies and insufficient capital to purchase soil supplements were reported as contributing factors. Low soil fertility was commonly cited as either the first or second most important production problem and hence the primary reason for the disappearance of bananas at some sites.

Farmers are generally aware that fallowing, crop rotation and soil supplements help to maintain and regenerate soil fertility. However, few farmers have sufficient land or capital to undertake such practices.

Additionally, some farmers indicated that they did not fully understand soil conservation practices and, therefore, did not know how to go about preserving their sites. As a result, the practice of soil conservation methods varied among farmers and sites.

Acidic or toxic soils (lunyo) were cited as the most important production constraints at 5 sites. In some cases, lunyo was believed to be present prior to primary land opening while, at other sites, lunyo was reported only after extensive land use. Nevertheless, farmers were able to differentiate between lunyo and exhausted soils: Lunyo soils are not restored following fallow whereas exhausted soils are.

Major pest problems for banana in Uganda include the banana weevil (*Cosmopolites sordidus*), root nematodes (*Radopholus similis*, *Pratylenchus* spp. and *Meloidogyne* spp.), Fusarium wilt (*Fusarium oxysporum* f. sp. *cubense*), and, more recently, black Sigatoka (*Mycosphaerella fijiensis*). Corm rot (*Armillaria* sp.) is another important disease but has an apparently restricted distribution as it was found only in the high-altitude areas of Mt. Elgon.

Banana weevil was reported as a major pest at 24 sites while root nematodes, Fusarium wilt and other pathogens were commonly overlooked and their damage, if noted, attributed to weevils or senescence. As a result, the importance of banana weevil was clearly overestimated by farmers.

The major factors that seem to have influenced the degree of farmer awareness and their efforts to control the pest problems were: (i) relative importance of bananas as food and source of revenue; (ii) previous exposure to extension and community information; (iii) current access to extension agents and other information sources; and (iv) the depth of banana culture in the community.

With few exceptions, potential control strategies against banana pests were seen as too costly, too labor consuming, or ineffective. The result has been deteriorating production output or shifts from cooking to more pest-tolerant brewing cultivars. Unfortunately, however, the most common hybrid beer varieties (Kayinja, Kisubi) are highly susceptible to Fusarium wilt.

Uganda grows a wide variety of cultivars. More than 150 highland cooking (Matooke) types, beer (Mbidde) belonging to AAA group, hybrid beer types (Kayinja ABB and Kisubi AB), dessert types, e.g. Bogoya (Gros Michel AAA) and Sukalindizi (AB), and roasting types Gonja (AAB), are cultivated. The Matooke types compose the main group with more than 100 cultivars.

It was observed that cultivars were named differently at different sites and according to different ethnic groups.

Different combinations of cultivars are grown by farmers but some cultivars are more predominant and widely distributed than others. A banana plantation could have a mixture of 10-20 cultivars. Farmers reported that cultivars were grown in such a mixture because: farmers were managing plantations that they inherited and found a mixture of cultivars in the established plantations (some plantations are over 100 years old); farmers admired and collected different cultivars from different regions of the country; cultivars performed differently in different soils; and sometimes farmers had no choice of seed when it came to establishing new plantations as they normally get the seed from their neighbours who already have mixed stands.

Bananas have varied maturity periods depending on cultivar, climatic conditions and soil fertility. Bananas take longer to flower when grown in infertile soils than in fertile soils. In the high-altitude sites, bananas take 1-2 years to flower and 6-9 months flowering to harvesting while, in the warmer lower altitudes, the bananas take 9-12 months to flower and 3-6 months flowering to harvesting.

The state at which fruit is harvested is judged visually. The choice of a level of fitness for harvesting bunches depends partly upon use of the bunches and partly upon the cultivar.

Traders supplying urban centers purchase large quantities of bananas which they have to transport over a long distance, taking a number of days between harvesting and sale. Under such circumstances, to avoid ripening before sale, farmers may harvest bunches they know may not yet be ready but such bunches will result in hard and tasteless matooke.

When bunches are for home consumption, depending on the cultivar, they are harvested almost at ripening time because at this stage they provide the best food.

Apart from food, bananas provide both alcoholic and non-alcoholic beverages, animal feed, and fiber used to produce various crafts. The fiber and leaves are also used as thatch and mulch.