Tanzania *Musa* Expedition 2001

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Executive summary

1. The 'Tanzania *Musa* Expedition 2001' (TME2001) was motivated by (1) a serious lack of knowledge about banana cultivars in the highlands of East-Africa other than the Great Lakes region, and (2) the growing risk that unexplored yet potentially important material for genetic improvement would get lost, due to changing farm management practices.

2. The *Musa* gene pool around the Great Lakes, including the Kagera area in Tanzania, has completely been identified, collected and duplicated *in vitro* over the last decades (Karamura D., 1999). Nothing of the sort had been effected for the bananas in the other Tanzanian highlands, nor in those of Kenya, beyond the rather sketchy collecting mission carried out by Baker and Simmonds almost fifty years ago (Baker *et* Simmonds, 1951 and 1952). That mission, however, discovered several cultivars which later on turned out to be edible diploids, plus a number of banana types which, on the base of the brief descriptions, seemed to be different from the Great Lakes cultivars. The collected material was planted at the then Imperial College of Tropical Agriculture (I.C.T.A.) in Trinidad, but was rapidly lost for its major part, probably because it could not survive for long at sea level altitude.

3. Agricultural evolution in East-Africa, as well as demographic pressure, urbanization and expanding trade possibilities, have as a consequence that in several cases attention and care of the crops by the farmer is progressively shifting from the traditional, and thus non-improved bananas, to temporarily more rewarding crops, such as maize and vegetables for example. Loss of genetic material is unavoidable, and the present team has in effect verified such loss. Saving the remaining germplasm was thus urgent.

4. The expedition was restricted to a 10 field-days visit in a zone including the slopes of the Kilimanjaro, the Usambara Hills and, to a lesser extent, the South Pare Hills. The central position of this zone in East-Africa was the rationale for the selection. Indeed, all the other highlands where bananas are cultivated are on the periphery of that zone: Taita Hills and Gikuyu area in Kenya, the Great Lakes region, Mbeya and Morogoro in Tanzania. The likelihood of detecting new germplasm, representative for many other highland regions was thus considered as maximal

5. The team for the expedition was exceptionally apt for achieving its purpose. Each of the three members has experience in *Musa* diversity exploration for more, to much more than 10 years. The expertise of the team collectivity extends to other, banana-focussed disciplines such as pathology/entomology, genetics and agronomy.

6. The expedition proved to be most successful. Twenty-one interesting cultivars were accessed, of which two only may already exist as synonyms in germplasm collections and/or *in vitro* gene banks. Of these 21 accessions, 10 are most probably newly acquired diploids of great potential interest for genetic improvement of the African Highland Bananas. An entirely new group of AAA-triploids has been identified, called 'Ilalyi'-group by the present team. No component of this group has ever been detected in the Great Lakes region. The hitherto rather

obscure nomenclature/synonymy of the cultivars in the visited zone has been substantially clarified. A broad picture of how African Highland Bananas in general may have been generated is proposed, with significant implications on genetic, as well as cultural and historical aspects. No wild (seedy) diploids were found, and the chances that they exist on the continent are now considered more than remote.

7. The team was able to collect much information regarding banana-specific management practices and utilization. It found several productive practices and many attractive preparations - of immature and/or mature fruits- that do not exist in the Great Lakes region. On the other hand, many of the preparations typical for the latter region are apparently not known in the visited zones. The team pleads for general cultural enrichment through mutual introduction of these practices and uses.

8. For each accession, three convenient suckers were collected. These have already been planted under optimal conditions on a special field at the Tengeru Horticultural Research Station, under the direct guidance of Dr A.S.S. Mbwana, member of the Expedition.

9. It is recommended that the team from this Expedition should visit the Tengeru field collection by about one year from now. Final identification/description/classification would be effected and necessary provisions taken by INIBAP for duplication at international level.

10. Similar expeditions should take place in the near future, especially in the not yet visited highlands (Taita, Gikuyu, Mbeya, Morogoro). These operations do have an urgent character for two reasons: (1) saving of genetic material and (2) final verification of presence/absence of any source of pollen in the context of Risk Assessment regarding the introduction of genetically transformed bananas at farm level in the future.

11. Finally, the team has the strong feeling that the 'Tanzania *Musa* Expedition' was successful and has been carried out in a most economical way, both in terms of time and of financial means. The composition of the team was thereby instrumental: three specialists in banana taxonomy, with one member having close contacts with local authorities and being familiar with local languages.

Recommendations

Recommendation 1

- Considering that the term 'AAA-EA' (AAA-East-Africa) is currently applied for the East-African Highland Bananas which belong to the AAA-group, and which are unique in traditional agriculture over the world;
- taking note of the newly found fact that a group of these AAA-EA cultivars, hereby called 'the Ilalyi-cluster', shows a distinct morphology which has not been observed among the AAA-EA cultivars in the Great Lakes region;
- underlining the fact that this cluster is of great importance in the areas visited by the Expedition, as well as the possibility that the cluster also exists on other highlands of Tanzania and highlands of Kenya;
- remarking that still other distinct AAA-EA clusters may exist in not yet studied areas of East-Africa;
- thus noticing that the general term 'AAA-EA' risks to create confusion;

Therefore it is recommended
- that the term 'AAA-EA *sensu stricto* (AAA-EA s.s.) be applied to the AAA-EA of the Great Lakes region, as previously identified and described (D. Karamura, 1999),
- that the term 'AAA-EA *sensu lato* (AAA-EA s.l.) be applied to all of the AAA-EA cultivars.

Recommendation 2

- Because the present Expedition has found a number of triploid AAA-cultivars that seem to be different from the previously identified and classified AAA-EA cultivars;
- because the Expedition also detected the existence of putative AA-diploids, for which the diploid status needs due confirmation;
- because the Expedition collected and tentatively described the said cultivars under various ecological conditions, so that assessment on identity can be subject to reconsideration;
- because the team consequently feels that the Objectives of the Expedition have not been achieved as to the exact identification of the collected cultivars;
- since the accessions have been planted on a same field collection at the Tengeru Horticultural Research Station in Tanzania;
- since representative cultivars of the AAA-EA s.s. group are grown at the same Tengeru Station and allow for any comparative study in AAA-EA diversity;

Therefore it is recommended

- that the same team spends a brief visit to the said field collection at fruiting stage (at about August 2002), in order to finalise the identification and classification of the accessions. The

results of this task would form the base for duplication at international level of the definitively identified new accessions.

Recommendation 3

- Since the relatively brief visit of the Expedition to the Kilimanjaro- and Usambara Mountains produced a substantial number of potentially new accessions;
- since the banana cultivars have not been subject to a comparable visit in other highlands except those of the Great Lakes region;
- considering the sharp contrast in the composition of the AAA-EA s.l. between the Great Lakes region and the areas visited by this expedition, the possibility still exist that other AAA and AA may exist in the other highlands;
- taking into the considerations the necessity for the assessment of the risk in uncontrolled natural crossing between genetically transformed bananas and local, even slightly fertile, cultivars in East-Africa.

Therefore it is recommended :
- that a second, similar expedition be effected to the Taita Hills and the Gikuyu area in Kenya, and a third one on the highlands in Mbeya and Morogoro in Tanzania.

Recommendation 4

- Since the Expedition team is of the opinion that it has sufficiently explored and collected the essential diversity;
- since it assumes that the total diversity was not collected in the visited zone, and that further cultivars of potential interest for genetic improvement still need to be accessed;
- since it has the strong impression that loss of diversity in banana cultivars occurs:
- and because a new expedition to the same areas would not be an economical solution;

Therefore it is recommended :
- that local agronomy officers explore further for such cultivars in the same zone, after getting duly acquainted with the basic diversity as it can be studied on the Tengeru Station field collection.

Recommendation 5

- Because nearly half of the accessions were identified as edible diploids, on morphological grounds;
- since edible diploids have played a basic role in the generation of the AAA-EA s.l.;
- since diploids are consequently of great potential importance in the genetic improvement of AAA-EA's;
- but because of their uncertain actual ploidy status;

Therefore it is recommended:
- that the ploidy of all the presumed diploids be assessed through flow cytometry/chromosome counting at the earliest possible convenience.

Seek the company of those who are looking for the truth,
but run from those who have found it.
Vaclav Havel

Foreword

It is often said that two specialists in a same discipline cannot work in close collaboration for long, without quarreling. Let alone three specialists.

We three have been continously working together 'on the field' for more than ten days. And we enjoyed every day, without a single flaw in our friendly relationship. No one had either the urge 'to take the lead', or the feeling to undergo a leadership. Our minds just worked in harmony, driven as we were by that single goal : to detect new cultivars and to understand their significance. It was an exceptional human experience.

We wish therefore to make clear that the present Report is the product of a Team, in which each member played a complementary role, at equal level, and in complete agreement of the other two members.

This expedition could, however, not have been carried out under such comfortable conditions without carefull preparation. Not once did we have a 'bad susprise', a *contretemps.* We are gratefull to Dr. Eldad Karamura, the Regional Coordinator of INIBAP for Eastern and Southern Africa. He organised the entire undertaking in a smooth yet rigorous way. He was thereby supported by the Director of INIBAP, Emile Frison, and his staff, who encouraged us and produced the necessary flexibility to accept the unavoidable last-minute modifications in planning and budgetting. We address a special word of gratitude to Suzanne Sharock, the INIBAP Germplasm Specialist who gave us many usefull technical hints based on her own experience in this sort of operation.

The Rockefeller Foundation, especially Dr. John Lynam, and the International Institute of Tropical Agriculture, the IITA, were confident that the expedition would be productive and they provided for the substantial financial means without which the operation could not have been realized. We hope that the Report will meet their expectations.

Mbwana, A.S.S Karamura, D. De Langhe, E.

A Special Word

We both take advantage of these pages to thank especially Dr.Alliy Mbwana. We know that he arranged for all the practical details in a very short time, just after his mission to the USA, and only a few days before our arrival at Arusha. He managed to continuously facilitate the communication with authorities, technical officers and farmers. The driver he selected, Mr. Lema, was an exceptional person, most careful for us while driving smoothly on the sometimes harsh secondary roads. Alliy's energy, knowledge, loyalty and great skill made a deep impression on us.

Deborah Karamura Edmond De Langhe

Introduction

The 'Tanzania *Musa* Expedition 2001' (TME2001) was motivated by a double concern:

- the serious lack of knowledge about banana cultivars in the highlands of East-Africa other than the Great Lakes region (cfr'Background Information');
- the growing risk that unexplored yet potentially important material for genetic improvement would be lost, due to changing farm management practices.

The International Network for the Improvement of Banana and Plantain (INIBAP) subscribed to this concern. Both the Rockefeller Foundation and the International Institute of Tropical Agriculture (IITA) were found ready to substantially share with INIBAP the expenses of the operation.

INIBAP's Regional Office for Eastern and Southern Africa (BARNESA), under the leading of Dr. Eldad Karamura, organized the expedition to the greatest satisfaction of the expedition team.

The expedition team consisted of:

- Dr. Deborah Karamura, *Musa* taxonomist specialized in the East-African Highland Bananas (EAHB);
- Dr. Alliy Mbwana, National Banana Research Coordinator in Tanzania and equally versed in the taxonomy of the EAHB;
- Dr. Edmond De Langhe, experienced Banana Research specialist with keen interest in the origin of the EAHB's.

The original intention was to visit both the highlands of N.E.Tanzania and of Kenya, i.e. the Taita Hills and the Gikuyu area. Considerations of efficiency prompted the organizers to restrict the operation to Tanzania. It was indeed felt that the above-explained remaining shortage in the knowledge on highland bananas could be more serious than expected. An initial and thorough study in a limited area would basically clarify the picture, and produce a solid framework for subsequent visits to other areas, not only those in Kenya, but other highland areas in Eastern and Southern Africa as well.

The following Objectives were agreed for this expedition:

- Explore and determine the current diversity found in the North East mountain ranges of Kilimanjaro, Usambara and Pare.
- Determine and collect any possible new banana varieties particularly diploids (AA), that are not yet found in *Musa* Germplasm collections
- Discuss and agree on the Establishment of the collected materials.
- Report Findings of the Expedition.

The core of the present Report consists of the two Chapters 'Identification of the Cultivars and Implications' and 'Management Practices and Utilisation'. They directly reflect the observations and deductions of the team.

It will be noticed in the first of these chapters that the presumed shortage in the knowledge on highland bananas in East-Africa was indeed serious, that many diploids have been collected, and that an entirely 'new' group of highland AAA-triploids, i.e. the 'Ilalyi-group', has been identified. The evident potential of the diploids for the genetic improvement of the EAHB's is explained. A working hypothesis on the generation of the EAHB's is advanced. The photographic illustration in this report reveal this newly acquired knowledge and could enrich future editions of INIBAP *Musalogue* series.

The second chapter highlights and describes the rather sophisticated banana management practices in the Chagga area in all its facets. Previous publications on some of these practices do exist, but they are generally dressed in a larger context and not by banana-specialists. The team feels that Chagga-system could serve as a model for several other highland areas, even in non-volcanic edaphic conditions. The contrast with the rather lose banana management practices in the Usambara region is underlined, as well as the conviction that the importance of the banana is in decline there, with definite loss of germplasm as a consequence. Of great potential is the wide spectrum in the utilisation of all these cultivars as described in this report. Many of these end-uses are not known in the Great Lakes region, and a strong plead is made in favour of their mutual exchange over the whole of highland East-Africa.

Background Information

1. The East African Highland Bananas (EAHB) are unique

Bananas remain the vanguard of food security on the Eastern African Plateau, where the crop is the staple food for over 20 million people. Moreover the crop's role in food import-substitution in the region can not be over emphasised and in some parts of the region , it is a key commercial crop and/or a major source of raw materials for both beverage and handcraft industries.

Somatic mutation has been instrumental in the diversification of this group which may account for more than 60 cultivars.These bananas have never been recorded anywhere else in the tropical world in traditional farming context (Shepherd, 1957). Generation of basic triploids from edible diploids *within the African continent* apppears to be the only model for explaining this geographicaly unique presence, very remote from the primary centre of *Musa* diversity in S.E.Asia.

2. Edible diploids in East Africa

A few edible diploids had been rather incidentaly found in coastal zones and on humid slopes of some hills and mountains in East-Africa (Baker and Simmonds, 1951 and 1952). They were briefly described (Shepherd, 1957), and one diploid, 'Paka', has been used in the 'Gros Michel' breeding program in Jamaica (Simmonds, 1966).

There has been no systematic search for such diploids although from oral reports and visits to local collections (Sebasigari, 1992), banana researchers remain strongly under the impression that the spectrum in diploids must be larger than the hitherto recorded one. *Systematic search of the edible diploid germplasm in East-Africa should clarify the situation regarding the origin of the EAHB.*

3. Genetic improvement of the EAHB

Research is focussed on the resistance to diseases (black Sigatoka) and pests (nematodes, borer weevil).The natural sources of resistance in current breeding programs (IITA, FHIA, CRBP) are morphologically and physiologicaly distant from the requiring EAHB, and the fruits from the obtained promising resistant hybrids do not as yet sufficiently show the characteristics of the traditional cooking- and beer varieties. One solution is to backcross them to (semi-fertile) edible diploids showing such characteristics.*East African edible diploids may well turn out to be the most adequate parents for such backcrosses.* The use of local EAHB diploids in the breeding programs of the triploid EAHB would not only be considerably cost effective, but may also produce the desired results a lot faster than is currently envisaged.

4. Precise location of the African edible diploids.

Judging from oral reports on cultivars that are not familiar to the Great Lakes farmers, the presumed diploids are grown in the same places where the rare and ill-classified diploid cultivars had been recorded :
- the Usambara Hills and the humid slopes of the Kilimanjaro in Tanzania ;
- the humid slopes of the Taita Hills and of Mount Kenya in Kenya.

As for the islands Zanzibar and Pemba, where diploids had been found, it is deduced from the rare descriptions that they are not geneticaly proximal to the EAHB (*vide* 'Paka') and that they rather belong to what may be called 'the Indian Ocean Complex' of cultivars, with strong presence of germplasm from India and S.E.Asia (De Langhe *et al*., 1994-5, De Langhe and de Maret, 1999).

5. Have all the EAHB triploids been explored ?

It can be stated that the diversity in EAHB cultivars has been sufficiently explored in the Great Lakes region. Indeed, these EAHB's have been collected and duly identified after a country-wide exploration in Uganda (Karamura.D, *op.cit.*). They overlap for the most part the EAHB diversity as found in the Kagera region (Tanzania) and observed in the field collection of the Maruku Agricultural Research Station. They also are represented by numerous synonyms in Rwanda, Burundi and the Kivu region of the Democratic Republic of Congo (Sebasigari, 1987). It is therefore assumed that the field collections at Kawanda and Mbarara (Uganda), and their *in vitro* duplicates at Kawanda, do cover about 90% of the actual diversity in EAHB's. The remaining rare cultivars merely being sports of the collected ones, of minor importance.

However, the regions considered in the above paragraphs have never been subject to a systematic exploration and have thus never been duly observed in field collections. But several cultivars had been collected during the 1980s in a rather incidental way in Kenya, and grown afterwards on a field collection at ICIPE's Experimental Site of Ungoye (Western Kenya). A brief visit to that collection brought to light that some of these cultivars, although with a triploid morphology, could not be identified as typical EAHB (Sebasigari, 1992). They were at variance with the classic EAHB in the relative lengths of flower parts (e.g. 'Mtagatu', 'Mtoto') or in the colour of the innern bract ('Itarecia', 'Solyo').

There is also the mysterious 'Kitarasa' with its orange-yellow immature pulp and 'non-staining orange-tinted sap', recorded in the 50's in Moshi (Kilimanjaro) area, and never properly described/classified since (Baker and Simmonds, *op.cit.*; Simmonds, 1966).

Consequently, sufficient indications pointed to the existence of some cultivars grown in highlands other than those of the Great Lakes region, and which would not be the EAHB's as classified by D. Karamura (1999).

Chapter 1.

The identification of cultivars and their implications

Introduction

The mode of operation for identifying the relevant cultivars and for collecting the corresponding accessions is explained in the 'back-to-office Report' in Annex 3.

The team was able to collect a substantial number of cultivars that are not yet existing in *Musa* gene banks. At least 10 accessions could be qualified as AA-diploids on the base of their morphology, 7 of these constituting a newly identified cultivar-cluster. Five other accessions represent a newly identified AAA-cluster, typical for the areas visited, and apparently absent in the Great Lakes region. The remaining 5 accessions most probably belong to the group of the AAA-EA cultivars, but some may be absent in the Great Lakes region as well.

A large number of cultivars were found to be present in both the Kilimanjaro and the Usambara regions, and corresponding synonymy was sorted out in the respective Chagga and Shamba'a languages.

Table 1 reflects the tentative identification and classification of the accessions, and includes some other essential information. The detailed description for each accession is found in Annex 1, while an alphabetical list of the cultivars is shown in Annex 2.

Synonymy

While the Shamba'a language shows phonological variation only, over the area, the Chagga language has many actual dialects with entirely different terms for banana cultivars. Synonymy thus exist in the Kilimanjaro area.

The Chagga dialects have been grouped by Phillipson in Western, Central and Eastern Chagga, with respectively Kichame, Mochi and Rombo as the dominant dialect. Terminology for banana does not differ much within each of these groups. The 'Ilalyi' for example is named as such in Kichame, and 'Mlali' in the two other dialects. 'Ifwanaya' in Kichame appears to be called 'Ndishi' in the central group, and so on.

A systematic study of the synonyms could not be achieved by the team, due to time pressure. Since the team is confident of having explored and qualified the basic diversity in Chagga-bananas, it *suggests that study of synonymy be carried out in the near future, with the present classification as reference.*

Table 1: Classification, synonymy and main features of accessions collected

	Chagga	Shamba'a	Accession[1]	Photos	Relevant descriptors[2]	Notes TME: Tanzania *Musa* Expedition. The accessions were numbered in the chronological order of their collection. For the complete description of accessions, see the collection forms in Annex 1.
A	**M'chare**	**Huti**			**Imbricate bud** **Persistant flowers and bracts. White anthers. Erect leaves -> diploid**	
	Llelembwa	---	TME 06	1,2	Deeply imbricated Fleshy persistent style Open bunch	
	N'shonowa	Huti	TME 07 TME 17	3,4,5,36	Dry persistent style Compact bunch, finger bending inwards	
	Madjugu 1	---	TME 03	[3]	= N'shonowa[4]	[3] Male bud are systematically cut off at early stage in Chagga area, with the exception of 'Mchare Ilelembwa' which is removed somewhat later. [4] Identical morphology. Said to mature earlier, hence more 'marketable' (*u'ogo* mean 'market' in Kichame)
	Madjugu 2	---	TME 04		= Madjugu?[5]	[5] Apex of fingers on first hands slightly longer. Bunch was younger than with Madjugu 1. Accessions to be compared on field collection.
	Nduuya	--- (Kahuti?)		6?[6]	= N'shonowa Shorter fingers	[6] No convicing case was found. Quite some confusion with the next cultivar may exist among the farmers.
	Ngumadu	Kahuti[7]	TME 16	6?	= N'shonowa Slightly imbricated only. Much less persistent flowers and bracts	[7] *ka-* is diminutive prefix in Shamba'a and would point to shorter fingers. Hence confusion with the previous accession. To sort out on a same field collection.
	---	Shumba nyeelu	TME 12	7,8	= N'shonowa Yellow bud [8]	[8] May be the 'mhalihali' in Evers' paper on cultivars in Morogoro area (Evers, 1992)

[1] An alphabetical list of cultivars is provided in Annex 2. For the management of te plant and for their utilization, see chapter 2.

[2] Regarding 'Kinsukari usin iguse', the frist-like fingers on a compact, subhorizontal bunch produce a morphology identical to Mukubyakonde, a cultivar of the AAA-EA 'Nakabululu'-group. This group has blunt male buds, however. The term *using iguse* mean 'do not touch me' and explains that the ripe fingers tend to drop. Still, if diploidy is confirmed, then this accession may prove to be of importance in the genetic improvement of Nakabululu, and could in the meantime provide identification of how this group may have been generated in Africa.

[3] The group of AAB-Plantains were not part of the objectives of the expedition. They are however, traditionally cultivated in East-Africa since a long time, and the very confused local nomenclature for the region (in literature) called for clarification, which we could achieve.

[4] The kiswahili name of the 'French plantains' is 'Msusu'. They are called 'Mhoye' in Usambara, and 'Mbo' or Mbwe' in Chagga area

[5] Three basic 'French Plantain' cultivars were observed on the one visited farm on the lowland flank of the East-Usambara Hills. They correspond to the 'afati', the 'yumba' and the 'otiti' (Olombo language in rainforest), described by De Langhe (1961). Only the latter cv. had a special name here: 'm'hoye wa kipaanje' which means 'the Mhoye with aromatic flavour'.

[6] In Chagga area, a 'yumba'-type was found, with well-developed bunch at 1700m asl on the Machame flank of the Kilimanjaro.

[7] The Kiswahili name for the Horn Plantain is 'Mkono wa tembo' (the elephant's trunk'). No term in local language could be detected, neither for Chagga nor Shamba'a. No False Horn plantain was observed, although the type is represented under the name 'Mzuzu ya kati' in the Morogoro zone to the South (Evers, *op.cit.*)

	---	M'dole?	No 9	9	= N'shonowa Long rachis-internodes	[9] Observed at Mianzani, a lowland village. Stool with heavy BS, hence artefact? See photo
	Halyi	**Mboko**			**Slender male bud and – pseudostem. Fingers with blunt apex. Bud color and sheath wings <u>not</u> = AAA-EA s.s.[10]**	**[10] Bud is paler. Sheaths are closely clasping the pseudostem, with scaried wings. The plant is freely stooling and said to be quite hardy. Leaves are not erect.**
	Halyi 'green'	Su'u	TME 02	10-14,36	Prototype	[11] No distinct name, neither in Chagga nor in Shamba'a. [12] Petiole wings. Pink color of midrib extends to dorsal side of sheath.
	Halyui 'red'	Su'u[11]	TME 08	15,16	Pinkish pseudostem[12]	
	Kitarasa[13]	---	TME 09	14	= Ilalyi with orange-yellow sap	[13] Called 'Imanri' in Kishame (Chagga dialect) according to Gerard Philipson (1984). [14] Morphology indentical to Ilayi 'green'.
	---	Mha'a-ha'a[15]	TME 21	17,18	= Ilalyi 'red' with lax bunch	[15] Mhalahala in Bondei language. Not to be confounded with the Mhalihali of Morogoro area (= 'Shumba nyeelo' in Shamba'a).
	ilalyi nduuya	Mpighiti		11?	= Ilalyi with shorter fingers	
	---	M'lema	TME 13	19	= Ilalyi with very large, plump, cucumber-like fingers	
	AAA-Ea Sensu stricto				**Cfr D. Karamura's classification**	
	Ifwanayia	---	TME 01	20,21	Nfuuka-type	
	Inanambo	---	TME 05		Close to Musakala	
		N'thebwa	TME 19	22,23	Looks Nakyetembwa	
	Ibwi	---	TME 20	24,25	= Musakala but more bitter[16]	[16] Progressively replaced by the true Musakala (intro from Bukoba) in Chagga area.
	---	N'tindii 1	TME 11	26,27	Nfuuka-type?[17]	[17] The male bud looked somewhate paler in color.
	-tooke	-tooke			Several recent introductions from Bukoba	
	Putative diploids[18]					[18] The three accessions tentatively grouped hereunder have not been reported in literature and could thus be newly discovered ones.
	---	Ntindii 2	TME 14	28,29	Close to wild *acuminata* [19]	[19] The plant was found in lowland area and called 'Ntindii with short fingers'. It obviously is not the 'Ntindii 1'. The compact bunch on a subhorizontal axis (but not the pseudostem) reminds of a *M. acuminata* subsp. *Siamea*.
	---	Kisangamachi	TME 15	30-33	Not AA-Sucrier[20]	[20] The brown blotches on a pale-gree, non-waxy pseudostem, as well as the inflorescence would point to AA-Sucrier. But the almost closed petiole canal is revealing for this plant to be special.
	Kisukari usin iguse	---	TME 10	34,35	Nakabululu-bunch, but pointed male bud	See also 'comments'

Comments and Suggestions

1. Mchare and Ilalyi

The groups 'Huti' and 'Mboko' in the Usambara region have definitely been identified. They respectively correspond to the groups 'Mchare' and 'Ilalyi' in Chagga area. 'Mchare' is already a well-accepted name in literature, but was confined to a single cultivar, while the name evidently covers the whole of the first of these groups, both on morphological grounds and in the minds of the Chagga farmers. The Chagga area has a rather central position in the banana-growing regions of East-Africa.

For these reasons, *the team proposes that nomenclature for the two groups be restricted to 'Mchare' and 'Ilalyi'.*

2. Diploids

Ten, out of the 21 accessions, are presumably diploids. The invariably erect leaves in the M'chare cluster point to diploidy, which was apparently confirmed for one previously collected component of the group (Shepherd, 1957; Simmonds, 1966). Thus, the cluster would be a candidate in the generation of AAA-EA. Typical AAA-EA, however, do have pink anthers, and the chances of this cluster having played a role may be small. But 'pink' could be dominant over 'white' in this particular AAA-formation and the genetics need to be assessed. The 3 remaining 'putative diploids' of the Table 1 manifestly show a diploid morphology all over the plant.

All these diploids, perhaps together with some of the previously collected ones in Zanzibar and Pemba , may have played a role in the genesis of the triploid AAA in East-Africa. Their current scarcity in pollen is easily explained by their age as a clone. Vegetative propagation over 3000 years or more is responsible for the heavy decline in male fertility, but generally less strong decline in female fertility of edible diploids since the time they were domesticated in S.E.Asia and New Guinea (Simmonds, 1962). All depends on the time of their introduction in Africa, and if this happened more than 1000 years ago, they may have been far more fertile at the time.

Consequently, *such diploids offer great prospects for the genetic improvement of the African Highland Bananas*, in that they would help reconstruct the types desired by farmers, through proper and judicious back-crossing of hybrids and transgenics.

***3. AAA-EA* sensu largo versus *AAA-EA* sensu stricto**

The genotypes of the Mchare's and Ilalyi's are clearly different from those of the hitherto identified and classified AAA-EA. The collective name of the latter has been widely adopted as representing the so-called highland cultivars in the Great Lakes region. However, the Mchare's and the Ilalyi's also thrive on the highlands (between 1000m and 1800m asl.), albeit more to the East and South-East of the Great Lakes[1]. On the other hand, and apart from the diploid AA's, there seems to be no trace of any yet other sort of AAA Highland bananas in East-Africa, so that their essential diversity may well have been definitely explored.

[1] Consulted literature strongly indicates that these two groups are popular on the mountainous zones of Kenya (Baker and Simmomds, *op.cit.*).

The team therefore recommends the following generic nomenclature, in order to avoid confusion:

- **AAA-EA s.s.,** i.e.AAA-EA *sensu stricto*, for the African Highland bananas such as they have been identified and classified by D. Karamura (*op.cit.*);
- **AAA-EA s.l.,** i.e. *sensu largo*, including AAA-EA s.s., plus the 'Ilalyi'-group and perhaps still other unexplored AAA-groups

A new concept for the East-African Highland Bananas.

1. The significance of the Rift Valley

When the cultivars of the Great Lakes region are considered together with those that have been fairly well identified by the Expedition, the following differentiation in cultivar-composition appears:

1. the *AAA-EA in the strict sense*, i.e. the 5 clusters classified in Uganda by D. Karamura (Nfuuka, Nakitembe, Nakabululu, Msakala, Mbidde), of basic importance in the Great Lakes region, and of very minor importance in the visited Kilimanjaro- and Usambara areas;
2. the *Ilalyi*-cluster, with the typical slender bud and blunt fingers, very popular in the visited areas;
3. the diploid *Mchare's*, which co-exist with the Ilalyi's[2];
4. a minor group of other edible diploids in N.E.Tanzania, apparently more important in the lowland zone to the East of Usambara, and down to the coast, as well as on the islands of Pemba and Zanzibar.

The highland bananas in Kisumu area (Kenya) seem to belong to the AAA-EA s.s. and would not include Mchare's nor Ilalyi's, with perhaps a few exceptions (Baker and Simmonds, *op.cit.*; D. Karamura, pers.comm.). The region has not been thoroughly explored, but if this is the reality, then the Kisumu area offers the same AA-EA s.s. gene pool as in the other Great Lakes areas.

As for the composition of the cultivars in Gekuyu area in Kenya, there are sufficient indications that it is a complex one, whereby the AAA-EA s.s. would form but a small minority (Baker and Simmonds, *op.cit.*; Shepherd, *op.cit.*).

Formulated otherwise: The AAA Highland bananas (as a group) of the Great Lakes region are almost completely different in composition from those of mountainous Kenya and N.E. Tanzania.

[2] One cultivar in the Great Lakes zone resembles a M'chare, and more specifically the 'Llelembwa'. It is called Orohuna, Igihuna, Ikihonye, Muniamimba, pending the locus, and which show the same characters. But this cv. is a triploid (AAA)…

The very few, by this team observed, exceptions are the AAA-EA s.s.:

- 'Nakitembe' which is grown in the Gikuyu zone and also far to the South-East, in Usambara Hills (cfr. Table 1, Nthebwa)[3]. This is, according to the Kintu-legend, the banana introduced by him in Uganda;
- a 'Nfuuka'-type, i.e. 'Ifwanaya' in the Chagga region;
- two 'Musakala'-types, i.e. 'Inanambo' in Chagga, 'Ibwi' in Usambara.

Hence a broad and suggestive picture appears:

The Rift Valley is the border between the AAA-EA s.s. to the West, and the AAA-EA s.l. to the East. Diploids (especially the 'Mchare'-cluster) are numerous to the East and almost non-existent to the West.

If one accepts that bananas 'moved' from the Coast westwards, then the Rift Valley would have functioned as a filter which would let have pass (to the West) only the few basic AAA-EA s.s. cultivars, which are still present to the East. These cultivars would have been at the origin of the now numerous AAA-EA cultivars in the Great Lakes region, through intensive vegetative propagation and correlated somatic mutation over at least 1000 years.[4]

2. Genetical and historical significance of the new concept.

The picture suggests, from East to West, a decreasing basic diversity (i.e. from "AAA-EA s.l. + diploids" to AAA-EA s.s.), and an increasing 'intra-cluster' diversity, especially at the AAA-EA s.s. level.

It fits rather well with a Hypothesis formulated by one of us in a preparatory document, and which is explained in Annex 4.

We quote:
"The hypothesis behind this operation: *more or less domesticated AA entered the continent and some of them are at the origin of the Highland AAA bananas (*tooke *and* mbidde*), the EA-AAA. If the hypothesis is correct, the* ***African farmers were the architects of the current EA-AAA."***

But, while the team could find a satisfactory answer to a number of questions raised in the said document (Annex 4), it could not solve some of the key items required for critical assessment of the hypothesis, and in addition new questions arose.

Yes, the East-West regression in basic edible diploid diversity seems to be proved. But the regression can in principle have three different reasons:

(1) it can point to a very ancient history, with progressive loss during the initial East-West move;
(2) it can be the result of relatively recent introductions that have as yet not 'penetrated' the continent;

[3] Probably in traditional context, and not as a relatively recent introduction from the Great Lakes area.
[4] The existence of bananas in Great Lake region since perhaps the 5th century has been proved on linguistic grounds (Schoenbrun, 1994-5).

(3) it can be due to ecological reasons, in that most diploids of the lowland East are not thriving well on higher altitudes.

The reason (3) does not exclude reason (1), however, and reason (2) seems unlikely because 'more recent edible *acuminata* bananas' are the more hardy triploids, over the tropical world. One cannot perceive the incentive for people bringing the weaker diploids in relatively recent times. Yet, several of these diploids are known only with a kiswahili name…

Of key importance therefore is the diploid 'Mchare'-cluster. They are perfectly adapted to highlands and grow vigouroulsy there. They show several typical characteristics of the AAA-EA and could thus have played a role in the generation of the latter. *But the acid test is to cross them with AAA-EA and examine the hybrids in their anther-colour*. If the pinkish color of the AAA-EA dominates over the white anther colour of the Mchare parents, then the Mchare's definitely would be candidates for this generation, right within Africa.

Three other observations of the expedition would more convincingly point to an ancient-to-very-ancient history:

(1) the many utilization practices noted by the team considerably vary from area to area, and do not exist for the most part in the Great Lakes region. They play a fundamental role in the culture of the Chagga, the Pare and the Shamba'a and can thus hardly be considered as more recent innovations. It looks very significant in this respect that the Shamba'a never use the bananas for beermaking;

(2) even the seniors among the many farmers (and the ladies, who after all proved to be the most familiar ones with these crops), when asked for the etymology of their cultivar names, could not be of any help. They all held the firm opinion that the cultivar names were of genuine Chagga-*versus* Shamba'a origin, but could not 'explain' them. This is in sharp contrast with the Great Lakes region, where the nomenclature for cultivars can rather easily be derived from the local lexicon. The obscure, but 'Chagga, or Pare, or Shamba'a sounding' etymology in N.E.Tanzania points to a since long forgotten period, when the names did have a significance in the local vocabulary;

(3) a similar situation seems to exist for cultivars that may have been lost. The document on Annex 4 lists a number of names (in Chagga as well as in Shamba'a) which had no meaning whatsoever for the farmers, and for which they could not show any cultivar**.** These names had been reported by missionaries by the end of the 19th century, and published in dictionaries. Even if some of these cultivars still may exist in not-yet-visited remote places, the general impression is that a once important diversity was, and still is declining.

Whatever the chances of the above advanced hypothesis on the genesis of the AAA-EA s.l. that it reflects the historical truth, the overall picture, with the Rift Valley as a major natural instrument in the differentiation of the *Musa* germplasm, *has far reaching implications for genetic improvement as well as for the reconstruction of the general history in East-Africa.*

The basic gene pool of all the AAA-EA s.l. being to the east of the Rift Valley, its components (including the numerous diploids) should be screened and used for the genetic improvement of any AAA-EA s.l. cultivar, and thus for AAA-Ea s.s. cultivars as well.

The same 'picture' could serve as a backbone for the reconstruction of the cultural-and agricultural history of East-Africa.

Diversity exhaustively explored?

The team feels that it has sufficiently explored the basic diversity in banana cultivars for both areas. From conversations with farmers as well as trough some cross-checking, the team got the firm impression that no surprises are to be expected in the non-visited Eastern side of the Chagga zone. Apart from the AAB-Plantains, the only other traditional bananas would be the AA's indicated in Table 1.[5]

Beyond the categories/clusters which figure on Table 1, there would thus only exist the (very few but ubiquitous-) so-called alien cultivars (AB, AAB, ABB) which do not form part of the Objectives, and which previously have been collected elsewhere.

Variation within each category is almost certainly somewhat larger than reflected on the Table, but unexplored cultivars would not significantly differ from the ones listed. For example, more variation in the pseudo-stem colour may exist within the Ilalyi cluster, but would have no agronomic impact. Moreover such sort of variation may be merely due to ecological conditions.

However, and as is explained on the previous item, the team had tried in vain to find some cultivars of which the name appears in literature. The possibility of cultivar losses looks convincing for the Shamba'a zone, where the importance of bananas has been steadily decreasing over the 20th century, in favour of maize. Thus, part of the original diversity may have been lost. But the team is of the opinion that the basic diversity has not deteriorated to the degree that whole categories would have been lost.

Still, the possible further loss of cultivars is of concern, and it was fortunate that the expedition could save the essential diversity via the collected material. *It is recommended that local agronomy officers explore further for such cultivars, after getting duly acquainted with the field collection of the here listed ones.*

The situation on the Pare Hills.

The farmers on the North- and South Pare Mountains, the 'Pare', are a composite population, the result of many immigrations from various regions over the last centuries, up to the present time. Most farmers point to the Taita Hills (Kenya) as their region of origin, but one notices many persons from Usambara, Kilimanjaro and even Uganda.

This area was not selected for an extensive visit, since traditional cultivars would have been very difficult to identify as belonging to original Pare farmers. But a brief visit to the banana belt in South Pare Hills revealed the existence of an actual 'banana groove', exclusively populated with the cultivar 'Ilalyi' ('Mneyrere' in Pare language). Less than 50 years ago, the groove formed a continuum all along a major valley and must originally have been planted by the ancestors.

[5] The bananas of the Coastal Zone and of the Islands are not in consideration here. Some additional AA's such as Paka do exist in that zone.

The groove firmly testifies for (1) the 'Ilalyi' being one of the first banana cultivars, if not the oldest one, in this and proximal regions and (2) the outstanding stooling capacity of this cultivar-group, which allows for perennial behaviour without any maintenance practice, similar to that of wild bananas, but without seeds of course.

A population of Ensete ventricosum *in Usambara Mountains*

According to some sources, the *Ensete ventricosum* would at a more humid period have constituted a gigantic belt in East-Africa, stretching from near the coast, over the Usambara-, Pare-, Taita Hills, to the Kilimanjaro complex, and reaching lower altitudes down to 700m asl and even less. (De Langhe, 1994-5). With the subsequent dry era, which is still reigning, the belt would have been broken up, with eventually small relicts in each of the mountains.

Ensete had a profound significance in ceremonies and rites all over East-Africa. The team could verify that the *Ensete* still subsists at the far-eastern end of the supposed belt, in the Usambara Mountains. The plant even produces active populations wherever mountain forest is cleared, as Photo 37 shows.

Towards a Final Classification.

Many of the above considerations as well as the Classification do have a tentative character. Verification/correction/finalisation can only take place when the accessions are planted and observed in a same Field Collection and at a same time. The team has carefully avoided the collection of synonymes, but the existence of a couple of duplicates cannot be ruled out. Some descriptors (such as the dimensions of the plant and its parts, or color aspects, or else: bunch configuration) depend too much on the different local conditions in which the accessions were growing.

Since only three suckers per accession could be collected[6], the accessions can not afford any loss of material. They presently have been assembled at the Tengeru research station. The following operations have to be avoided:

- further transport of suckers;
- direct in vitro transplantation of the meristem-tip of even a single of the 3 suckers.

Therefore the team came to the conclusion that the accessions be planted at Tengeru, since the following favorable conditions exist there:

- the Station offers all the required facilities for an excellent Field Collection (logistics, fertilization, chemical treatments, assistants and educated labor, fences, etc);
- Dr. A.S.S. Mbwana, member of the team and thus fully informed on the accessions, is the Banana Research Coordinator of Tanzania, a *Musa* taxonomist with considerable experience in organizing and maintenance of large Field Collections. He is staying and working at Tengeru as Program Director. He will thus be in the best possible position to monitor all the involved operations.

[6] The suckers were harvested on the same stool that was described in the Collection Forms, and the farmer could evidently not allow for complete exhaustion of the stool.

Beyond individual observation of the accessions during the year, the need for a collective characterization by the present team, at fruiting stage of the accessions, is the prerequisite to a final classification and characterization.

The team recommends its collective and brief visit (3 days) to the Field Collection, about one year from now, i.e. July 2002, for final identification of the accessions. The visit to be considered as the ultimate part of the present Expedition.

Follow-up. Risk Assessment.

In the light of all above considerations, it becomes of prime essence to study the Taita- and Gikuyu areas in Kenya: their intermediate geographical position is the key to completely understand the genetic, cultural and historical aspects of the traditional AA/AAA in East-Africa.

It is highly recommended that an Expedition, with the same objectives as the present one, be carried out in the banana-zones of Kenya, in the near future.

The verification of the picture as explained sub 'Comments and Suggestions', with its genetical and historical/cultural implications, calls for exploration of two other important banana cultivation zones in Tanzania, in the same conditions under which the present Expedition was achieved. They are: (1) the eastern slopes of the Morogoro hills and (2) the Mbeya region.

It is recommended that a similar expedition takes place in the said zones.

Only when these two remaining Expeditions have been carried out will it be possible to entirely address the risk assessment issue in the context of genetic manipulation of the bananas in east-Africa.

Despite constant scrutiny during this expedition, the team could not find any trace of wild (seedy-) diploids in the whole of the Kilimanjaro-Pare-Usambara complex. The chances of natural crossing between *Musa*-transgenics and wild plants are thus minimal-to-non in the Great Lakes region as well as in the by this expedition zones visited by this expedition. But risk can as yet not be excluded in the same way for the non-explored banana growing zones. This is another reason for urgent realization of the above two recommended Expeditions. If no wild-nor fertile pollen bearing edible diploids are found there, then programs for genetic manipulation of the AAA-EA s.l. bananas will be able to face the risk assessment issue in a satisfactory way, down to the level of the farms.

CHAPTER 2.

Management and utilization practices And of these implications

Introduction

The use and management of bananas in the Kilimanjaro, Usambara/Pare regions is known to be ancient. This is because these are areas near the East African coast, better watered and represent the probable and earliest routes of bananas to Africa. They also probably represent the earliest areas where the highland bananas could have evolved. These areas have an old tradition of the crop, as in the Great Lakes region of East Africa, however the diversity here is too low and the crop management practices are also very different from those in the great lakes region. In addition, the crop distribution pattern gives an indication of a disappearing crop, particularly in the Usambara areas. This is not because of extensive exploitation but rather it has the appearance of a crop whose value is being lost gradually for reasons which are difficult to understand.

➔ While, there are different *ex-situ* conservation programmes in Tanzania where different banana cultivars have been collected and conserved and documented, cultivars in Kilimanjaro, Usambara/Pare regions have never been collected nor conserved in these centres.

➔ While these mountainous areas have a high biological diversity together with cultural diversity determined by the presence of Wachagga (Machame, Wakibosho,Warombo, Uru), Washamba, Wambugu and the Pare ethnic groups, diversity in some crops like bananas cannot be correlated with the diversity of ethnic groups. These tribes constitute indigenous peasants with cultivars of crops developed over hundred of years, a time which allowed these groups to interact with the surrounding environment and domesticate of different plants. These people base their subsistence on bananas, maize, sunflower, coffee, sweet potatoes, cassava and different types of vegetables. Except the Wa Chagga, it is very difficult to determine which crop these different ethnic groups depend on both as a cash or food crop.

➔ For the banana crop, the different ethnic groups manage the crop differently; something which can have some theoretical implications.

Observations made on the different management and utilization systems of the banana crop among the different ethnic groups.

During the *Musa* expedition it was found necessary to make observations on the management and utilization of the banana crop. The objectives were to

* understand cultural aspects involved in the use and management of bananas in order to analyze how selection and other possible evolutionary processes could have been carried out.

* analyze morphological features considered to be best for different purposes of use and management of the crop in order to visualize differences in phenotypic frequencies in banana populations managed in different ways.

The observation process which involved field trips to different but targeted and selected areas of Kilimanjaro, Usambaa/Pare regions, provided time with farmers to participate in some lengthy discussions to know how they manage and utilise bananas. New banana cultivars would be collected, 3 per accession and pre-morphological field characterization carried out to allow further elaboration on the way farmers use the different parts of the crop.

A Uses:

1. Inventory of different uses of bananas in the Kilimanjaro and Usambara areas.

	Part of the plant	Kilimanjaro (Chagga)	Usambara (Shambaa, Mbugu)
1	Corm	Used as food during famine	Used as food during famine
2	Roots	Medicinal	Medicinal
3	Pseudostem	Used as forage	Used as forage
4	Dried sheaths	Thatching, ropes	Thatching, ropes
5	Leaves	Forage,fences, thatching	Thatching
6	Male buds	Forage	Forage, toys
7	Fruit	Food	Food
		Beer	Dessert
		Dessert	
8	Peelings	Forage	Forage

2. Description of ways of preparation and consumption of banana resources obtained from bananas.

Bananas are prepared in different ways as food in these areas. Commonly they are roasted or fried and used as snacks in restaurants or form niche markets on roads. But they can also be cooked in various ways as explained below.

Mtore

Meat cut into small pieces is boiled first and then placed on mature but unripe peeled and washed bananas in water and the mixture is boiled for a long period until soft enough to be mashed into a running paste which can be taken as porridge or soup. This is a common dish in the Kilimanjaro area and it is called Mtore and taken at breakfast time. A cultivar called Inanambo is commonly used for this, although Ifanaiya a beer cultivar can also be used.

Masharari

Another common and major dish made in the Kilimanjaro region is Masharari. Meat is cut in small pieces and boiled for an hour, then mixed with mature but unripe peeled bananas. The mixture is boiled for forty five to sixty minutes until both the bananas and meat are soft enough to be eaten. The mixture is then served. Beans or peas can be used instead of meat. This mixture is equivalent to Katogo dish commonly prepared with matooke in Uganda.

Kitalolo

There are times when meat/beans/peas are out of season and farmers resort to mixing bananas with cowpeas leaves. The leaves are boiled, mashed and mixed with boiled peeled bananas to give a similar mixture as above but with cowpeas leaves. The dish is called Kitalolo.

Kitawa

Kitawa is another prepared snack made from boiled and mashed bananas mixed with fermented milk.

Badaa

Majority of bananas in these highlands do not make soft food as the pulp is hard. Farmers peel and dry green bananas on any drying platform like large stones, or below or on top of the roofs. The dried fruits are left to ferment until all fruits are covered with fungus, then they are made into flour. Banana flour together with cassava flour are mixed with boiling water to make Badaa which is equivalent to Ugali made from maize in Kenya and Uganda. The more fungi covering the fruit, the more flavoured is the Badaa produced. This dish is very common in the Usambara areas.

Kimanda bread

Kimanda is bread in these highlands do not make soft food, as the pulp is hard. Farmers peel and dry green bananas and any drying platform like large stones, or below or on top of the roofs. The dried fruits are left t ferment until all fruits are covered with fungus, then they made into flour. Banana flour together with cassava flour miexed with boiling water to make Badaa which is equivalent to Ugali made from maize in Keny and Uganda. The more fungi covering fruit, the more flavoured is the Badaa produced. This is very common in the Usambara areas.

Beer

Beer drinks are made from bitter and astringent bananas. In Kilimanjaro area, Ilali and Ifanaiya are widely used in beer making. Plastic or metal buckets filled with skinned soft ripe bananas were common sites. Farmers remove skins off the ripe fruits of mentioned cultivars, pack them carefully in plastic or metallic buckets and carry them to brewing homes. The ripe peeled fruits are boiled with water, then they decant and take juice and descard the remaines. The juice is put in a clean canoe and finger millet is added and the mixture allowed to ferment for a period of one day to form and alcoholic drink called Mbege. It is later filtered and ready to drink.

Dessert

There are number of cultivars which can be used as dessert particularly those whose fruits are not bitter. These include Huti, Haahaa, Kisukari and Kimalindi. Some of these are sold in markets on roads

Forage

The banana crop is forage in the Kilimanjaro region. There is continuous chopping of plants to be given to cows. Some plants can be over chopped to leave only young erect leaves. It is not clear whether the erectness of some plants is genetic or due to daily cutting of leaves.

B. Emphasis on morphological features considered to be best for different uses of the crop.

There is some recognition of qualities and special uses given to different cultivars. Farmers have recognized that some cultivars are hard on cooking and some are bitter and astringent. In Kilimanjaro area, those which are bitter and astringent are used for beer. Those which are hard are cooked for along time to become soft or they are roasted or fried. In the Usambara Mountains, the bitter types and hard ones are peeled and dried to make flour. There is no banana beer making in Usambara areas probably because majority of people are Moslems. However, farmers in each region have started accessing Highland banana cultivars from Bukoba, Tanzania and Uganda, because they are softer on cooking than their local ones.

C. Management

Kilimanjaro and Usambara are part of the banana-coffee farming systems which are characterized by intensive smallholder production of subsistence and cash crops in Tanzania. Arabica coffee is the main cash crop while bananas form the major food crop. In the Kilimanjaro region, bananas are maintained in an integrated system consisting of huge tall trees forming a top canopy layer, bananas forming a second canopy layer and arabica coffee, the last layer. Within the system are cows being stall-fed using long wooden containers where chopped pseudostems, leaves, peduncles and peelings are placed to allow continuous feeding of the animals. Using bananas as forage is an important practice in the Kilimanjaro region. Attached to stalls are cow dung outlets providing easy access of dung to the fields to provide manure to the banana gardens. Soil

fertility in this area does not seem to be a major problem since the soils in the Kilimanjaro region are volcanic and cows provide manure (though not enough) to further improve the soils. There is a need however to know what type and how much of cow dung should be applied in the system and where it should be placed.

Bananas are grown in small pockets along the slopes of Usambara mountains where the soils have been mentioned to be acidic and poor in nutrients (Iversen, 1987) at a 1,000 meter above sea level. The present population in these highlands is said to be more than 100 people per square kilometer, a figure which is high for an agriculture based-rain forest area, and a pressure for more arable land. The system here is not integrated as that in Kilimanjaro area. Cows are fewer in the system but also maintained in stalls found above the banana groves to allow cow dung to flow in the plantation. Cows here are not fed on banana plants but mainly on cut grass.

There are number of common banana management practices carried out by farmers in the banana growing zones of Africa and these include

- Collecting planting materials from neighbours or far relatives
- De-belling
- De-suckering
- Detrashing
- Mulching with banana leaves and sheaths
- Putting wood ash on mats

Bananas in Kilimanjaro and Usambara/Pare regions are grown in a mixture as in the Great Lakes region but the above management activities were not common in the regions. Farmers commonly collect planting materials from their own gardens, and this does not allow exchange of materials and hence reduces variation. In the Kilimanjaro areas, the intensive mixed farming does not allow mulching using the parts of the plant. Every part of the plant and sometimes bunches are cut for animals-feed while cow's dung provides manure for the groves. This means that any debelling, desuckering and detrashing is done to feed cows. Although there were cases where farms indicated to have weevils and nematodes, there were no observable corrective measures to reduce pests. In the Usambara mountain region, the commonest stress to plants was weeds. Diseases like black Sigatoka were not seen on local varieties like M'chare and Ilalyi but Fusarium was seem on Bluggoe subgroup cultivars. Bananas were grown on steep slopes where there is generally no obvious terracing therefore weeding becomes very difficult.

Marketing of bananas to urban areas was common in Kilimanjaro region where M'chare a popular cultivar is sold, and selection is greater in this cultivar than other cultivars and hence variation is also greater in M'chare. Ripe bananas are sold in niche markets along the roads but roasted M'chare is also common in similar markets and restaurants.

Implications

The low diversity of bananas in the north eastern ranges of Tanzania (Kilimanjaro, Usambara/Pare) compared to that in the Great Lakes region of East Africa needs some explanation. In addition having no rituals or complexities associated with the banana crop both during management and in food preparation, raises another question of how

ancient is the crop in the region. Currently, there is very little selection pressure to cause variation in the crop because much of the crop is used by animals which can eat any part of the plant from any cultivar. There is no selection pressure for planting materials, farmers leave the plants to grow continuously and they continue to select from what they planted. Could it be that exchange of planting materials became very difficult due to long distances between communities some years back? For Usambara where there is no longer any integrated systems like that in Kilimanjaro, but different scattered patches of the crop exist along the slopes of the mountain ranges and around homes. There is an indication that these patches are remnant of groves of bananas that once existed and that there has been gradual loss of cultivars and rejection of the crop at large.

However as indicated in the previous chapter, the crop is believed to be ancient in the region and there has been a continuous loss of cultivars from the original germplasm due to ecological reasons and probably other social and economic pressures.

ANNEX 1

Tentative description of the accessions

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION:**TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): **TME 01** PHOTOGRAPH No. **20,21**

COLLECTING DATE (DD/MM/YYYY) (2.4) **10/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4) **AAA-EA s.s.**[1]

LOCAL/VERNACULAR NAME (2.16): **IFANAIYA**[2]

LOCAL LANGUAGE: **KIMACHAME** ETHNIC GROUP (2.17): **WACHAGGA**

COLLECTING SITE LOCATION

LOCATION NAME**: ROO VILLAGE**

SITE No. (2.2): **01** COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **HAI** LOCATION (2.8) km **65 FROM ARUSHA**:

LATITUDE (2.9): **3 °16' 719 S** LONGITUDE (2.10): **37° 12' 167 E** ELEVATION (2.11): **3,677 FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__**3**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.Backyard Cropping system: 1.Monoculture

2.Smallholding **2.1.Mixed cropping (mostly tree crops) coffee**

3.Midsize holding 2.2.Mixed cropping (mostly food crops)

4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture**2. Mostly tree crops**3. Mostly food crops

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert 2.Cooking **3.Beer/brew/wine** **4.Animal feed** 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: **2.Pseudostem:** **3.Male bud: for forage**

NOTES: PREVAILING STRESSES (2.27) **NONE**

BUNCH WEIGHT (2.30):I_____**45-50KG**_____I PLANT CROP CYCLE (2.31) **2ND**:

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

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SLOPE (°) (5.1.4): **ON SLOPE**

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[1] AAA-EA s.s. versus s.l.: see Chapter 1, Comments and Suggestions, sub (4).

[2] Or 'Ifwanayia'. Difficult phonology.

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):
Grassland 2 Forbland **3** **Woodland** 4 Shrubland 5 Savanna 6 Other

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SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 Low **2 Intermediate** 3 High
SOIL TEXTURE: I__II_____I

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):
POST-MOVEMENT ACTIVITIES DATA (2.28)
Treatment of sample during the mission (3.8.1): **CORM PARING**
Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**
CHARACTERIZATION MINIMUM DESCRIPTORS
PLANT GENERAL APPEARANCE (6.1)
Leaves habit (6.1.1): **INTERMEDIATE** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)
Pseudostem height (m)(6.2.1):**5.5 M** Sap colour (6.2.7): **MILKY**
Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9):**2**
Pseudostem colour (6.2.3): **GREEN with DEEP BLACK PIGMENTATION**
Pigmentation of the underlying pseudostem(6.2.6): **PINK-PURPLE**

PETIOLE/MIDRIB/LEAF (6.3)
Blotches at the petiole base (6.3.1):**SMALL BLOTCHES** Colour of midrib dorsal surface (6.3.20):**GREEN**
Blotches colour (6.3.2):**BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**
Petiole canal leaf III (6.3.3):**OPEN, MARGINS SPREADING** Blotches on leaf of water suckers (6.3.23):**NONE**

INFLORESCENCE/MALE BUD (6.4)
Peduncle length (cm) (6.4.1): **60 CM** Rachis position (6.4.12): **AT AN ANGLE**
Peduncle hairiness (6.4.5): **COARSELY HAIRY** Rachis appearance (6.4.13)**: BARE**
Bunch position (6.4.6): **SLIGHTLY ANGLED** Male bud type (6.4.14): **NORMAL**
Fruits (6.4.10): **BISERIATE** Male bud shape (6.4.15): **LIKE A TOP**
Rachis type (6.4.11): **PRESENT**

BRACT (6.5)
Bract apex shape (6.5.2): **SLIGHTLY POINTED** Bract scars on rachis (6.5.8):**PROMINENT**
Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9):**DISCONTINUE**
Colour of the bract external face (6.5.4) **PURPLE-BROWN**: Bract behaviour before falling (6.5.12):**REVOLUTE**
Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13):**VERY FEW**

MALE FLOWER (6.6)
Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT**
Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**
Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22): **LIGHT GREEN**
Free tepal appearance (6.6.8): **SIMPLE FOLDING** Ovary pigmentation (6.6.23) **NONE**
(or presence of pollen**: NONE**

FRUIT (6.7)
Hands:12
Number of fruits (6.7.2): **25 in 2nd hand** Mature fruit peel colour (6.7.13):**YELLOW**
Fruit length (cm) (6.7.3): **14cm** Pulp in fruit (6.7.17): **WITH PULP**
Fruit shape (6.7.4): **Slightly curved** Pulp colour at maturity (6.7.19): **CREAM WITH BROWN STREAKS**
Transverse section of fruit (6.7.5): **SLIGHTLY RIDGED** Presence of seed (6.7.23): **NONE**
Fruit apex (6.7.6): **ALMOST POINTED**

inibap-**IPGRI**
Collecting form for Banana (*Musa* spp)
CIRAD
***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**
EXPEDITION:**TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION
COLLECTING No. (2.3): TME 02 PHOTOGRAPH No. **10-14, 36**

COLLECTING DATE (DD/MM/YYYY) (2.4) **11/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4) **AAA-EA s.l. Ilalyi**

LOCAL/VERNACULAR NAME (2.16): **ILALYI (GREEN)**

LOCAL LANGUAGE: **KIMACHAME** ETHNIC GROUP (2.17): **WACHAGGA**
COLLECTING SITE LOCATION
LOCATION NAME**: UDURU VILLAGE, BOX 8469, MOSHI**
SITE No. (2.2): 01 COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **HAI** LOCATION (2.8) km **65 FROM ARUSHA**:

LATITUDE (2.9): **3 °15' 005 S** LONGITUDE (2.10): **37° 13' 607 E** ELEVATION (2.11): **4,075 FEET**.asl
COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE
COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): | 3 | TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)
Status of plantation: 1.Backyard Cropping system: 1.Monoculture
2.Smallholding **2.1.Mixed cropping (mostly tree crops) coffee**
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops
POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert 2.Cooking **3.Beer/brew/wine** **4.Animal feed** 5.Medicinal

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OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)
1.Leaves: 2.Pseudostem: **3.Male bud: for forage**

NOTES: PREVAILING STRESSES (2.27) **NONE**

BUNCH WEIGHT (2.30): **35 KG** I PLANT CROP CYCLE (2.31) : **4TH**

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5. Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland **3** **Woodland** 4 Shrubland 5 Savanna 5 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **INTERMEDIATE** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): **4.05 M** Sap colour (6.2.7): **MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9):**6**

Pseudostem colour (6.2.3): **GREEN & DEEP BRONZE PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK-PURPLE**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1):**SLIGHT** Colour of midrib dorsal surface (6.3.20): .V4; **SLIGHTLY PINKISH**

Blotches colour (6.3.2):**BROWNISH- BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **ERECT MARGINS** Blotches on leaf of water suckers (6.3.23):**NONE**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1):**30.5 CM** **VERY SHORT** Rachis position (6.4.12): **AT AN ANGLE**

Peduncle hairiness (6.4.5): **FINELY HAIRY** Rachis appearance (6.4.13)**:BARE**

Bunch position (6.4.6): **PENDULOUS** Male bud type (6.4.14):**NORMAL**

Fruits (6.4.10):**BISERIATE** Male bud shape (6.4.15):**L ANCEOLATE**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8):**PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9):**DISCONTINUE**

Colour of the bract external face (6.5.4) **PURPLISH-BROWN**: Bract behaviour before falling (6.5.12):**REVOLUTE**

Colour of the bract internal face (6.5.5):**ORANGE-RED** Wax on the bract (6.5.13):**VERY FEW**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2):**CREAM** Style shape (6.6.19):**CURVED UNDER STIGMA**

Compound tepal pigmentation (6.6.3):**NONE** Stigma colour (6.6.20):**ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4):**YELLOW,**

DEEPLY LOBED Ovary basic colour (6.6.22):**LIGHT YELLOW**

Free tepal appearance (6.6.8):**BROADLY CORRUGATED** Ovary pigmentation (6.6.23):**NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**:10**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13):**YELLOW-GREEN**

Fruit length (cm) (6.7.3): **12.5cm** Pulp in fruit (6.7.17):**WITH PULP**

Fruit shape (6.7.4):**SLIGHTLY CURVED** Pulp colour at maturity (6.7.19): **WHITE WITH BROWN STREAKS**

Transverse section of fruit (6.7.5): **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BLUNT**

NB: Anthers aborted

Petiole margins deep red, closely clasping the stem

inibap-**IPGRI**
Collecting form for Banana (*Musa* spp)
CIRAD
***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**
EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION
COLLECTING No. (2.3): TME 03 PHOTOGRAPH No.: **footnote**[3]

COLLECTING DATE (DD/MM/YYYY) (2.4) **11/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **edible AA** SUBSPECIES/SUBGROUP (1.5.4) **M'CHARE**:

LOCAL/VERNACULAR NAME (2.16**): M'CHARE MADJUGU 1**

LOCAL LANGUAGE: **KIMACHAME** ETHNIC GROUP (2.17): **WACHAGGA**
COLLECTING SITE LOCATION
LOCATION NAME**: UDURU VILLAGE, BOX 8469, MOSHI**
SITE No. (2.2): **01** COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **HAI** LOCATION (2.8) km **65 FROM ARUSHA**:

LATITUDE (2.9): **3 °15' 005 S** LONGITUDE (2.10): **37° 13' 607 E** ELEVATION (2.11): **4,075 FEET**.asl
COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE
COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__**3**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)
Status of plantation: 1.Backyard Cropping system: 1.Monoculture
2.Smallholding **2.1.Mixed cropping (mostly tree Crops) coffee**
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking (roasting)** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)
1.Leaves: 2.Pseudostem: **3.Male bud: For forage**

NOTES: PREVAILING STRESSES (2.27) **NONE**

BUNCH WEIGHT (2.30):**45-50 KG** I PLANT CROP CYCLE (2.31)

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

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[3] No good photos could be taken of the bunches, which are at a height of more than 4m on these volcanic, well manured soils. Also, the leaves are erect and thus hiding the bunch. Finally, farmers were relectant to have bunch-bearing pseudostems cut. The same holds for 'Madjugu 2'.

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):
1. Grassland 2 Forbland **3** **Woodland** 4 Shrubland 5 Savanna 5 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **ERECT** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): >**5 M** Sap colour (6.2.7): **MILKY**
Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9):
Pseudostem colour (6.2.3): **BRIGHT GREEN & SLIGHT PIGMENTATION**
Pigmentation of the underlying pseudostem(6.2.6): **PINK-PURPLE**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1)**NONE** Colour of midrib dorsal surface (6.3.20): **GREEN**
Blotches colour (6.3.2) **BLACK (FEW)** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**
Petiole canal leaf III (6.3.3) **WIDE WITH ERECT MARGINS** Blotches on leaf of water suckers (6.3.23):**NONE**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **LONG** Rachis position (6.4.12): **AT AN ANGLE**
Peduncle hairiness (6.4.5): Rachis appearance (6.4.13)**: WITH PERSISTENT FLOWERS**
Bunch position (6.4.6): **PENDULOUS** Male bud type (6.4.14): **see footnote (5)!**
Fruits (6.4.10):**BISERIATE** Male bud shape (6.4.15):
Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): Bract scars on rachis (6.5.8):
Bract imbrication (6.5.3): Fading of colour on bract base (6.5.9):
Colour of the bract external face (6.5.4) Bract behaviour before falling (6.5.12):
Colour of the bract internal face (6.5.5): Wax on the bract (6.5.13):

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): Style shape (6.6.19):
Compound tepal pigmentation (6.6.3): Stigma colour (6.6.20):
Lobe colour of compound tepal (6.6.4): Ovary basic colour (6.6.22):
Free tepal appearance (6.6.8): Ovary pigmentation (6.6.23)
(or presence of pollen**:**

FRUIT (6.7)

Hands**:**
Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13):**YELLOW-GREEN**
Fruit length (cm) (6.7.3): Pulp in fruit (6.7.17):**WITH PULP**
Fruit shape (6.7.4):**SLENDER AND LONG** Pulp colour at maturity (6.7.19): **WHITE**
Transverse section of fruit (6.7.5):**SLIGHTLY** **RIDGED** Presence of seed (6.7.23): **NONE**
Fruit apex (6.7.6): **SLIGHTLY BOTTLE NECKED**

NB:ANTHERS SAID TO BE CREAM. Fruits strongly recurved towards rachis. Margins somehow spreading out but more clasping than in AAA-EA

Differences with Madjugu (2). I) has not got pronounced fruit apex ii) fruits more rounded than angular iii) early maturing, softer on cooking, more susceptible to Cigar end rot

inibap-**IPGRI**
Collecting form for Banana (*Musa* spp)
CIRAD
***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**
EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION
COLLECTING No. (2.3): TME 04 PHOTOGRAPH No.

COLLECTING DATE (DD/MM/YYYY) (2.4) **11/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **edible AA** SUBSPECIES/SUBGROUP (1.5.4) **M'CHARE**:

LOCAL/VERNACULAR NAME (2.16): **M'CHARE MADJUGU 2**

LOCAL LANGUAGE: **KIMACHAME** ETHNIC GROUP (2.17): **WACHAGGA**
COLLECTING SITE LOCATION
LOCATION NAME**: UDURU VILLAGE, BOX 8469, MOSHI**
SITE No. (2.2): **01** COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **HAI** LOCATION (2.8) km **65 FROM ARUSHA**:

LATITUDE (2.9): **3 °15' 005 S** LONGITUDE (2.10): **37° 13' 607 E** ELEVATION (2.11): **4,075 FEET**.asl
COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE
COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__**3**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)
Status of plantation: 1.Backyard Cropping system: 1.Monoculture
2.Smallholding **2.1.Mixed cropping (mostly tree crops) coffee**
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking (Roasting)** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)
1.Leaves: 2.Pseudostem: **3.Male bud: for forage**

NOTES: PREVAILING STRESSES (2.27) **NONE**

BUNCH WEIGHT (2.30):**45-50 KG** I PLANT CROP CYCLE (2.31) **2ND**:

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland **3 Woodland** 4 Shrubland 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **ERECT** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): >**5 M** Sap colour (6.2.7): **MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9):

Pseudostem colour (6.2.3): **BRIGHT GREEN & SLIGHT PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK-PURPLE**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1) **SLIGHT** Colour of midrib dorsal surface (6.3.20): **GREEN**

Blotches colour (6.3.2) **BLACK (FEW)** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **WIDE WITH ERECT MARGINS** Blotches on leaf of water suckers (6.3.23):**NONE**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **LONG** Rachis position (6.4.12): **PENDULOUS and curves towards pseudostem**

Peduncle hairiness (6.4.5): Rachis appearance (6.4.13)**: BARE**

Bunch position (6.4.6): **PENDULOUS** Male bud type (6.4.14)

Fruits (6.4.10) : **BISERIATE** Male bud shape (6.4.15):

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): Bract scars on rachis (6.5.8):

Bract imbrication (6.5.3): Fading of colour on bract base (6.5.9):

Colour of the bract external face (6.5.4) Bract behaviour before falling (6.5.12):

Colour of the bract internal face (6.5.5): Wax on the bract (6.5.13):

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): Style shape (6.6.19):

Compound tepal pigmentation (6.6.3): Stigma colour (6.6.20):

Lobe colour of compound tepal (6.6.4): Ovary basic colour (6.6.22):

Free tepal appearance (6.6.8): Ovary pigmentation (6.6.23)

(or presence of pollen**:**

FRUIT (6.7)

Hands**:**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13):**YELLOW-GREEN**

Fruit length (cm) (6.7.3): Pulp in fruit (6.7.17):**WITH PULP**

Fruit shape (6.7.4):**SLENDER, LONG and ANGULAR** Pulp colour at maturity (6.7.19): **WHITE**

Transverse section of fruit (6.7.5):**PRONOUNCED RIDGES** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BOTTLE NECKED**

NB:ANTHERS SAID TO BE CREAM

Fruits strongly recurved towards rachis. Petiole margins somehow spreading out but more clasping than in AAA-EA.

Differences with Madjugu (1). i) has got pronounced fruit apex

ii) fruits more angular, Bunch shape cylindrical

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): **TME 05** PHOTOGRAPH No.

COLLECTING DATE (DD/MM/YYYY) (2.4) **11/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4) **AAA-EA s.s.**

LOCAL/VERNACULAR NAME (2.16): **INANAMBO**

LOCAL LANGUAGE: **KIMACHAME** ETHNIC GROUP (2.17): **WACHAGGA**

COLLECTING SITE LOCATION

LOCATION NAME**: UDURU VILLAGE, BOX 8469, MOSHI**

SITE No. (2.2): **01** COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **HAI** LOCATION (2.8) km **65 FROM ARUSHA**:

LATITUDE (2.9): **3 °15' 005 S** LONGITUDE (2.10): **37° 13' 607 E** ELEVATION (2.11): **4,075 FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): | **3** | TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.Backyard Cropping system: 1.Monoculture

2.Smallholding **2.1.Mixed cropping (mostly tree crops) coffee**

3.Midsize holding 2.2.Mixed cropping (mostly food crops)

4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: **3.Male bud: For forage**

NOTES: PREVAILING STRESSES (2.27) **NONE**

BUNCH WEIGHT (2.30):**45-50 KG** I PLANT CROP CYCLE (2.31) **2ND**:

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland **3** **Woodland** 4 Shrubland 5 Savanna 5 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **DROOPING, TIP TWISTED** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): >**5 M** Sap colour (6.2.7): **MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9):

Pseudostem colour (6.2.3): **GREEN & BLACK PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK-PURPLE**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1) **SMALL PIGMENTATION** Colour of midrib dorsal surface (6.3.20): **GREEN**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **OPEN WITH MARGINS SPREADING** Blotches on leaf of water suckers (6.3.23):**NONE**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **LONG** Rachis position (6.4.12): **PENDULOUS**

Peduncle hairiness (6.4.5): Rachis appearance (6.4.13)**: SEMI-PERSISTENT FLOWERS**

Bunch position (6.4.6): **PENDULOUS** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10): **BISERIATE** Male bud shape (6.4.15): **INTERMEDIATE**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **SLIGHTLY POINTED** Bract scars on rachis (6.5.8):**VERY PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9):**DISCONTINUES**

Colour of the bract external face (6.5.4)**PURPLE-BROWN** Bract behaviour before falling (6.5.12):**REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13):**SLIGHT**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19):**STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20):**ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4):**YELLOW** Ovary basic colour (6.6.22):**LIGHT GREEN**

Free tepal appearance (6.6.8):**SIMPLE FOLDING** Ovary pigmentation (6.6.23)**NONE**

FRUIT (6.7)

Hands**:**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13):**YELLOW-GREEN**

Fruit length (cm) (6.7.3): Pulp in fruit (6.7.17):**WITH PULP**

Fruit shape (6.7.4):**LONG AND SLE NDER** Pulp colour at maturity (6.7.19): **CREAM WITH BROWN STREAKS**

Transverse section of fruit (6.7.5):**PRONOUNCED RIDGES** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BOTTLE NECKED**

NB: Bunch looks like Kisansa (AAA-EA) from Uganda but pulp slightly astringent

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 06 PHOTOGRAPH No. **1,2**

COLLECTING DATE (DD/MM/YYYY) (2.4) **11/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3):**edible AA** SUBSPECIES/SUBGROUP (1.5.4) **M'CHARE**

LOCAL/VERNACULAR NAME (2.16): **M'CHARE LLELEMBWA**

LOCAL LANGUAGE: **KIMACHAME** ETHNIC GROUP (2.17): **WACHAGGA**

COLLECTING SITE LOCATION

LOCATION NAME**: UDURU VILLAGE, BOX 8469, MOSHI**

SITE No. (2.2): **01** COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **HAI** LOCATION (2.8) km **65 FROM ARUSHA**:

LATITUDE (2.9): **3 °15' 005 S** LONGITUDE (2.10): **37° 13' 607 E** ELEVATION (2.11): **4,075 FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__**3**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.Backyard Cropping system: 1.Monoculture

2.Smallholding **2.1.Mixed cropping (mostly tree crops) coffee**

3.Midsize holding 2.2.Mixed cropping (mostly food crops) **4.Plantation**

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: **3.Male bud: For forage**

NOTES: PREVAILING STRESSES (2.27) **NONE**

BUNCH WEIGHT (2.30):**45-50 KG** I PLANT CROP CYCLE (2.31) **4TH**:

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland **3** **Woodland** 4 Shrubland 5 Savanna 5 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |__| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **ERECT** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): **4.8 M** Sap colour (6.2.7): **MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9):

Pseudostem colour (6.2.3):**BRIGHT GREEN & SLIGHT BLACK PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK-PURPLE**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1) **SLIGHT** Colour of midrib dorsal surface (6.3.20): **GREEN**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **WIDE WITH ERECT MARGINS** Blotches on leaf of water suckers (6.3.23):**NONE**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **39 CM** Rachis position (6.4.12): **PENDULOUS**

Peduncle hairiness (6.4.5):**COARSELY HAIRY** Rachis appearance (6.4.13)**: PERSISTENT FLOWERS AND BRACTS**

Bunch position (6.4.6): **PENDULOUS** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10):**BISERIATE** Male bud shape (6.4.15): **ALMOST OVOID**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2):**INTERMEDIATE** Bract scars on rachis (6.5.8):**VERY PROMINENT**

Bract imbrication (6.5.3): **DEEPLY IMBRICATE** Fading of colour on bract base (6.5.9):**DISCONTINUES**

Colour of the bract external face (6.5.4)**RED** Bract behaviour before falling (6.5.12):**NOT REVOLUTE**

Colour of the bract internal face (6.5.5): **RED** Wax on the bract (6.5.13):**SLIGHT**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **CREAM-ORANGE**

Lobe colour of compound tepal (6.6.4):**YELLOW** Ovary basic colour (6.6.22): **LIGHT YELLOW**

Free tepal appearance (6.6.8):**SIMPLE FOLDING** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**:11**

Number of fruits (6.7.2):- **17 IN 2ND HAND** Mature fruit peel colour (6.7.13):**YELLOW-GREEN**

Fruit length (cm) (6.7.3): **27CM** Pulp in fruit (6.7.17):**WITH PULP**

Fruit shape (6.7.4):**LONG AND SLE NDER** Pulp colour at maturity (6.7.19): **CREAM**

Transverse section of fruit (6.7.5):**PRONOUNCED RIDGES** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BOTTLE NECKED**

NB: Anther whitish cream

Leaf length=358cm; Leaf width=94cm

Bract length =32.5cm; Bract width=21 cm

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 07 PHOTOGRAPH No. **3,4,5,36**

COLLECTING DATE (DD/MM/YYYY) (2.4) **12/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **edible AA** SUBSPECIES/SUBGROUP (1.5.4) **M'CHARE**

LOCAL/VERNACULAR NAME (2.16): **N'SHONOWA**

LOCAL LANGUAGE: **WAKIBOSHO** ETHNIC GROUP (2.17): **WACHAGGA**

COLLECTING SITE LOCATION

LOCATION NAME**: KOMBO VILLAGE, KIBOSHO AREA**

SITE No. (2.2): 02 COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **MOSHI** LOCATION (2.8) km :

LATITUDE (2.9): **3 °13' 912 S** LONGITUDE (2.10): **37° 15' 143 E** ELEVATION (2.11): **4,437 FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__3__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.**Backyard** Cropping system: 1.Monoculture
2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: **3.Male bud: For forage**

NOTES: PREVAILING STRESSES (2.27)

BUNCH WEIGHT (2.30):I PLANT CROP CYCLE (2.31) **4TH**:

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland **3** **Woodland** 4 Shrubland 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |__| (code: 3=Low ; 5=Moderate ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **ERECT** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): > **5 M** Sap colour (6.2.7): **MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9):

Pseudostem colour (6.2.3):**BRIGHT GREEN & SLIGHT BLACK PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK-PURPLE**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1) **SLIGHT** Colour of midrib dorsal surface (6.3.20): **GREEN**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **WIDE WITH ERECR MARGINS** Blotches on leaf of water suckers (6.3.23):**NONE**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): Rachis position (6.4.12): **PENDULOUS**

Peduncle hairiness (6.4.5): Rachis appearance (6.4.13)**: PERSISTENT DRY FLOWERS**

Bunch position (6.4.6): **PENDULOUS** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10):**BISERIATE & SRONGLY RECURVED** Male bud shape (6.4.15): **ALMOST OVOID**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2):**POINTED** Bract scars on rachis (6.5.8):**VERY PROMINENT**

Bract imbrication (6.5.3): **MODERATELY IMBRICATE** Fading of colour on bract base (6.5.9):**DISCONTINUES**

Colour of the bract external face (6.5.4)**RED** Bract behaviour before falling (6.5.12):**NOT REVOLUTE**

Colour of the bract internal face (6.5.5):**RED** Wax on the bract (6.5.13):**SLIGHT**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19):**STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20):**CREAM-ORANGE**

Lobe colour of compound tepal (6.6.4):**YELLOW** Ovary basic colour (6.6.22) **YELLOW WITH TINGE OF GREEN**

Free tepal appearance (6.6.8):**CORRUGATIONS PRESENT** Ovary pigmentation (6.6.23)**NONE**

(or presence of pollen**:NONE**

FRUIT (6.7)

Hands**:**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13) **YELLOW GREEN**

Fruit length (cm) (6.7.3): Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **STRONGLY RECURVED INSIDE** Pulp colour at maturity (6.7.19): **CREAM**

Transverse section of fruit (6.7.5) Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BOTTLE NECKED FRUITS**

NB: Anther cream-yellow

Bract length =21 cm; Bract width=14 cm

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 08 PHOTOGRAPH No. **15,16**

COLLECTING DATE (DD/MM/YYYY) (2.4) **12/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4) **AAA-EA s.l. ILALYI**

LOCAL/VERNACULAR NAME (2.16): **ILALYI RED**

LOCAL LANGUAGE: **WAKIBOSHO** ETHNIC GROUP (2.17): **WACHAGGA**

COLLECTING SITE LOCATION

LOCATION NAME**: KIMANGANONI VILLAGE, URU AREA**

SITE No. (2.2): **02** COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **MOSHI** WARD : **URUKUSIN**

LATITUDE (2.9): **3 °16' 931 S** LONGITUDE (2.10): **37° 21' 005 E** ELEVATION (2.11): **4,511 FEET** asl.

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__**3**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.Backyard Cropping system: 1.Monoculture
2.Smallholding **2.1.Mixed cropping (mostly treecrops) coffee**
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:**FOR ANIMALS**

NOTES: PREVAILING STRESSES (2.27)

BUNCH WEIGHT (2.30): **APP. 15KG** PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1.Grassland 2 Forbland 3 Woodland **4** **Shrubland** 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |__| (code: 3=Low ; 5=Moderate ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **DROOPING** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): **> 4.5 M** Sap colour (6.2.7): **MILKY**

Pseudostem aspect (6.2.2): **SLENDER** Number of suckers (6.2.9):

Pseudostem colour (6.2.3):**REDDISH BROWN**

Pigmentation of the underlying pseudostem(6.2.6): **PINK-PURPLE**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1) **LARGE BLOTCHES** Colour of midrib dorsal surface (6.3.20): **RED**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **WIDE WITH ERECT MARGINS & CLASPING THE PSEUDOSTEM**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): Rachis position (6.4.12): **SLIGHTLY ANGLED**

Peduncle hairiness (6.4.5): **COARSELY HAIRY** Rachis appearance (6.4.13)**: BARE**

Bunch position (6.4.6): **SLIGHTLY ANGLED** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10):**BISERIATE** Male bud shape (6.4.15): **LANCEOLATE**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8):**VERY PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9): **DISCONTINUES**

Colour of the bract external face (6.5.4)**PURPLE-BROWN** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13):**SLIGHT**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4):**YELLOW** Ovary basic colour (6.6.22) **GREEN**

Free tepal appearance (6.6.8):**CORRUGATIONS PRESENT** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**:**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13) **GREEN**

Fruit length (cm) (6.7.3): Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **CUCUMBER SHAPE** Pulp colour at maturity (6.7.19): **CREAM**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BLUNT**

NB: Anther Pinkish

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 09 PHOTOGRAPH No.

COLLECTING DATE (DD/MM/YYYY) (2.4) **12/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4): **AAA-EA s.l. ILALYI**

LOCAL/VERNACULAR NAME (2.16): **KITARASA**

LOCAL LANGUAGE: **KICHAGGA** ETHNIC GROUP (2.17): **WACHAGGA**

COLLECTING SITE LOCATION

LOCATION NAME**: ONGOMA VILLAGE, URU NORTH**

SITE No. (2.2): 02 COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **MOSHI**

LATITUDE (2.9): **3 °15' 549 S** LONGITUDE (2.10): **37° 21' 260 E** ELEVATION (2.11): **4,387 FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): | __3__ | TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.Backyard Cropping system: 1.Monoculture

2.Smallholding **2.1.Mixed cropping (mostly treecrops) coffee**

3.Midsize holding 2.2.Mixed cropping (mostly food crops)

4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking & Roasting** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

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OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud: **FOR ANIMALS**

NOTES: PREVAILING STRESSES (2.27)

BUNCH WEIGHT (2.30):I **APP. 15KG** PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1.Grassland 2 Forbland **3** **Woodland** 4 Shrubland 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **DROOPING** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): > 4.**5 M** Sap colour (6.2.7): **ORANGE-YELLOW**

Pseudostem aspect (6.2.2): **SLENDER** Number of suckers (6.2.9):

Pseudostem colour (6.2.3): **REDDISH BROWN**

Pigmentation of the underlying pseudostem(6.2.6): **PINK-PURPLE**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1) **LARGE BLOTCHES** Colour of midrib dorsal surface (6.3.20): **RED**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **WIDE, WITH ERECT MARGINS & CLASPING THE PSEUDOSTEM**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): Rachis position (6.4.12): **SLIGHTLY ANGLED**

Peduncle hairiness (6.4.5): **COARSELY HAIRY** Rachis appearance (6.4.13)**: BARE**

Bunch position (6.4.6): **SLIGHTLY ANGLED** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10) :**BISERIATE** Male bud shape (6.4.15): **LANCEOLATE**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8): **VERY PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9): **DISCONTINUES**

Colour of the bract external face (6.5.4) **PURPLE-BROWN** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13): **SLIGHT**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4):**YELLOW** Ovary basic colour (6.6.22) **GREEN**

Free tepal appearance (6.6.8):**CORRUGATIONS PRESENT** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**:**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13) **GREEN**

Fruit length (cm) (6.7.3): Pulp in fruit (6.7.17): **PRESENT**

Fruit shape (6.7.4) **CUCUMBER SHAPE** Pulp colour at maturity (6.7.19): **ORANGE**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BLUNT**

NB: Anther Plinkish

Corm-and Petiole Sap colour orange

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 10 PHOTOGRAPH No. **34,35**

COLLECTING DATE (DD/MM/YYYY) (2.4) **12/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **edible AA** SUBSPECIES/SUBGROUP (1.5.4)

LOCAL/VERNACULAR NAME (2.16): **KISUKARI USIN IGUSE**

LOCAL LANGUAGE: ETHNIC GROUP (2.17): **WACHAGGA**

COLLECTING SITE LOCATION

LOCATION NAME**: ONGOMA VILLAGE, URU NORTH**

SITE No. (2.2): 02 COUNTRY (2.5): **TANZANIA** REGION (2.6): **KILIMANJARO**

DISTRICT (2.7): **MOSHI**

LATITUDE (2.9): **3 °16' 029 S** LONGITUDE (2.10): **37° 21' 141 E** ELEVATION: **4,060FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__3__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.Backyard Cropping system: 1.Monoculture

2.Smallholding **2.1.Mixed cropping (mostly treecrops) coffee**

3.Midsize holding 2.2.Mixed cropping (mostly food crops)

4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): **1.Dessert** 2.Cooking 3.Beer/brew/wine 4.Animal feed 5.Medicinal

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OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)

BUNCH WEIGHT (2.30):I **VERY SMALL** PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland 3 Woodland **4** **Shrubland** 5 Savanna 6 Other

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SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **ERECT** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): >4 **M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **SLENDER** Number of suckers (6.2.9):

Pseudostem colour (6.2.3)**WAXY GREEN**

Pigmentation of the underlying pseudostem(6.2.6): **PINK**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**)SCARCE** Colour of midrib ventral surface (6.3.20): **WAXY GREEN**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **OPEN WITH MARGINS SPREADING**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **SHORT** Rachis position (6.4.12) **AT AN ANGLE**

Peduncle hairiness (6.4.5) **SLIGHTLY HAIRY** Rachis appearance (6.4.13)**: BARE**

Bunch position (6.4.6): **SLIGHTLY ANGLED** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10):**BISERIATE** Male bud shape (6.4.15): **LANCEOLATE**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8): **VERY PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9): **DISCONTINUES**

Colour of the bract external face (6.5.4) **PURPLE-BROWN** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13): **MODERATE**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **YELLOW**

Free tepal appearance (6.6.8):**CORRUGATIONS PRESENT** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**:**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13) **GREEN**

Fruit length (cm) (6.7.3): Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **SLIGHTLY CURVED** Pulp colour at maturity:**CREAM**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **POINTED**

NB: Anther Aborted

Nakabululu bunch but male bud pointed

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): **TME 11** PHOTOGRAPH No. **26,27**

COLLECTING DATE (DD/MM/YYYY) (2.4) **15/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4) **AAA-EA s.s.?**

LOCAL/VERNACULAR NAME (2.16): **NTINDII (1)**

LOCAL LANGUAGE: **KISHAMBAA** ETHNIC GROUP (2.17): **SHAMBAA**

COLLECTING SITE LOCATION

LOCATION NAME**: MBOKOI VILLAGE**

SITE No. (2.2): **03** COUNTRY (2.5): **TANZANIA** REGION (2.6): **USAMBARA**

DISTRICT (2.7): **LUSHOTO** DIVISION: **BUMBULU**

LATITUDE (2.9): **4 °51' 150 S** LONGITUDE (2.10): **38° 28' 467 E** ELEVATION: **4,719** **FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__**2**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: **1.Backyard** Cropping system: 1.Monoculture
2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): **1.Dessert 2.Cooking after made into flour** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

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OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)

BUNCH WEIGHT (2.30):I **SMALL** PLANT CROP CYCLE (2.31) : **4**

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland 3 Woodland **4 Shrubland** 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |__| (code: **3=Low** ; 5=Moderate ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **DROOPING** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): >**4.5 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **NORMAL** Number of suckers (6.2.9):

Pseudostem colour (6.2.3) **GREEN WITH BROWN TO BLACK PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**) MODERATE** Colour of midrib ventral surface (6.3.20):**GREEN**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **OPEN WITH MARGINS SPREADING**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **SHORT** Rachis position (6.4.12) **AT AN ANGLE**

Peduncle hairiness (6.4.5) **COARSELY HAIRY** Rachis appearance (6.4.13)**: BARE**

Bunch position (6.4.6) **HANGING AT AN ANGLE OF 45 °** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10): **BISERIATE** Male bud shape (6.4.15) **LIKE A TOP**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8): **VERY PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9): **DISCONTINUES**

Colour of the bract external face (6.5.4): **RED-PURPLE** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13): **VERY FEW**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **GREEN-YELLOW**

Free tepal appearance (6.6.8): **TWO FOLDS** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**:**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13) **GREEN**

Fruit length (cm) (6.7.3): Pulp in fruit (6.7.17): **PRESENT**

Fruit shape (6.7.4) **ROUNDED** (6.7.19): Pulp colour at maturity: **CREAM**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BLUNT**

NB:Compound tepal with 2 longitudinal arms, external lobes deeply lobed. Free tepal long as half the compound tepal. Bracts semi-persistent. Anther Aborted.

Kabula Bunch

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 12 PHOTOGRAPH No. **7,8**

COLLECTING DATE (DD/MM/YYYY) (2.4) **15/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **edible AA** SUBSPECIES/SUBGROUP (1.5.4) **M'CHARE**

LOCAL/VERNACULAR NAME (2.16): **HUTI (SHUMBA NYEELU)**

LOCAL LANGUAGE:**KISHAMBAA** ETHNIC GROUP (2.17): **SHAMBAA**

COLLECTING SITE LOCATION

LOCATION NAME**: MBOKOI VILLAGE**

SITE No. (2.2): **03** COUNTRY (2.5): **TANZANIA** REGION (2.6): **USAMBARA**

DISTRICT (2.7): **LUSHOTO** DIVISION: **BUMBULU**

LATITUDE (2.9): **4 °51' 150 S** LONGITUDE (2.10): **38° 28' 467 E** ELEVATION: **4,719** **FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__**3**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: **1.Backyard** Cropping system: 1.Monoculture
2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): **1.Dessert 2.Cooking after made into flour** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

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OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)

BUNCH WEIGHT (2.30):I **SMALL** PLANT CROP CYCLE (2.31) : **4**

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

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SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland 3 Woodland **4 Shrubland** 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: **3=Low** ; 5=Moderate ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **ERECT** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): >**4.5 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **NORMAL** Number of suckers (6.2.9):

Pseudostem colour (6.2.3) **GREEN WITH SLIGHT PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**)SLIGHT** Colour of midrib ventral surface (6.3.20):**GREEN**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **WIDE WITH ERECT MARGINS**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): Rachis position (6.4.12) **AT AN ANGLE**

Peduncle hairiness (6.4.5) **COARSELY HAIRY** Rachis appearance (6.4.13)**: PERSISTENT BRACTS & FLOWERS**

Bunch position (6.4.6) **HANGING AT AN ANGLE OF 45 °** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10): **BISERIATE** Male bud shape (6.4.15) **INTERMEDIATE**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8):**VERY PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9):**UNIFORM THROUGHOUT**

Colour of the bract external face (6.5.4): **GREEN-YELLOW** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5):**YELLOW** Wax on the bract (6.5.13): **VERY FEW**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19):**STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20):**ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **LIGHT YELLOW** Ovary basic colour (6.6.22) **GREEN**

Free tepal appearance (6.6.8):**RADIALLY CORRUGATED** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**:**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13) **GREEN**

Fruit length (cm) (6.7.3): Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **SLENDER** (6.7.19): Pulp colour at maturity:**CREAM**

Transverse section of fruit (6.7.5) **SLIGHTLY RIDGE** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BOTTLE-NECKED**

NB:Compound tepal external lobes broad.. Bracts semi-persistent.

Anthers white.

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 13 PHOTOGRAPH No. **19**

COLLECTING DATE (DD/MM/YYYY) (2.4) **15/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4) **AAA-EA s.l**. **ILALYI**

LOCAL/VERNACULAR NAME (2.16): **MLEMA**

LOCAL LANGUAGE: **MBUGU** ETHNIC GROUP (2.17): **WAMBUGU**

COLLECTING SITE LOCATION

LOCATION NAME**: KWALEI VILLAGE**

SITE No. (2.2): 03 COUNTRY (2.5): **TANZANIA** REGION (2.6): **USAMBARA**

DISTRICT (2.7): **LUSHOTO** DIVISION: **BUMBULU**

LATITUDE (2.9): **4 °51' 150 S** LONGITUDE (2.10): **38° 28' 467 E** ELEVATION: **4,719** **FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__3__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: **1.Backyard** Cropping system: 1.Monoculture
2.Smallholding **2.1.Mixed cropping (mostly treecrops) coffee**
3.Midsize holding **2.2.Mixed cropping (mostly food crops)**
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): **1.Dessert** 2.Cooking 3.Beer/brew/wine 4.Animal feed 5.Medicinal

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OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)

BUNCH WEIGHT (2.30):I **SMALL** PLANT CROP CYCLE (2.31) : **4**

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

Grassland 2 Forbland 3 Woodland **4** **Shrubland** 5 Savanna 5 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |__| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **DROOPING** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): >**4.5 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **NORMAL** Number of suckers (6.2.9):

Pseudostem colour (6.2.3) **GREEN WITH DEEP BROWNISH RED PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**)SMALL AMOUNT** Colour of midrib ventral surface (6.3.20):**REDDISH**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **WIDE WITH ERECT MARGINS**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): Rachis position (6.4.12) **PENDULOUS & RACHIS LONG**

Peduncle hairiness (6.4.5) Rachis appearance (6.4.13)**: BARE**

Bunch position (6.4.6) **PENDULOUS & LAX** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10):**BISERIATE** Male bud shape (6.4.15) **LIKE A TOP**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8): **PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9): **DISCONTINUE**

Colour of the bract external face (6.5.4): **PURPLE-BROWN** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13): **VERY FEW**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **GREEN**

Free tepal appearance (6.6.8):**2 FOLDS & A SMALL TIP** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**:**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13) **GREEN**

Fruit length (cm) (6.7.3):**26CM** Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **CUCUMBER SHAPED** Pulp colour at maturity: **CREAM**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BLUNT**

NB:Anthers Pink

Inibap **IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 14 PHOTOGRAPH No. **28,29**

COLLECTING DATE (DD/MM/YYYY) (2.4) **16/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **edible AA** SUBSPECIES/SUBGROUP (1.5.4)

LOCAL/VERNACULAR NAME (2.16): **NTINDII (2)**

LOCAL LANGUAGE: **KISHAMBAA** ETHNIC GROUP (2.17): **SHAMBAA on lowland**

COLLECTING SITE LOCATION

LOCATION NAME**: BETHANIYA VILLAGE**

SITE No. (2.2): **04** COUNTRY (2.5): **TANZANIA** REGION (2.6)**:EASTERN USAMBARA**

DISTRICT (2.7): DIVISION: **BUMBANI**

LATITUDE (2.9): **5 °07' 848 S** LONGITUDE (2.10): **38° 41' 795 E** ELEVATION: **622** **FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2.Farm**

No. OF SAMPLES (2.20): |__**3**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: **1.Backyard** Cropping system: 1.Monoculture

2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee

3.Midsize holding **2.2.Mixed cropping (mostly food crops)** 4.Plantation

---

CROPPING SYSTEM (2.8.2): 1.Monoculture 2. Mostly tree crops 3. Mostly food crops

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): **1.Dessert 2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27) **WEEDY & SUFFOCATED (NO DETRUSHING)**

BUNCH WEIGHT (2.30):I **SMALL** PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4): **ON SLOPE**

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland 3 Woodland **4** **Shrubland** 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |__| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **INTERMEDIATE** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): >**4 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **SLENDER** Number of suckers (6.2.9): **15**

Pseudostem colour (6.2.3) **WAXY GREEN WITH SLIGHT BLACK PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**)SMALL** Colour of midrib ventral surface (6.3.20):**WAXY GREEN**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **ERECT MARGINS & CLASPING STEM**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): Rachis position (6.4.12) **AT AN ANGLE**

Peduncle hairiness (6.4.5) **FINELY HAIRY** Rachis appearance (6.4.13)**: BARE**

Bunch position (6.4.6) **SUBHORIZONTAL** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10): **BISERIATE** Male bud shape (6.4.15) **LIKE A TOP**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8): **PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9): **DISCONTINUE**

Colour of the bract external face (6.5.4): **PURPLE-BROWN** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13): **VERY FEW**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT & SMALL**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **GREEN**

Free tepal appearance (6.6.8): **FEW FOLDS & TIP NOT WELL DEFINED** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**: 8**

Number of fruits (6.7.2):- Mature fruit peel colour (6.7.13) **YELLOWISH GREEN**

Fruit length (cm) (6.7.3): **5 CM** Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **CURVED** Pulp colour at maturity:**CREAM**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **ALMOST BOTTLE NECKED**

NB:Athers all aborted

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 15 PHOTOGRAPH No. **30-33**

COLLECTING DATE (DD/MM/YYYY) (2.4) **16/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **edible AA** SUBSPECIES/SUBGROUP (1.5.4)

LOCAL/VERNACULAR NAME (2.16): **KISANGAMACHI**

LOCAL LANGUAGE: **KISHAMBAA** ETHNIC GROUP (2.17): **SHAMBAA on lowland**

COLLECTING SITE LOCATION

LOCATION NAME**: KISIWANI**

SITE No. (2.2): **04** COUNTRY (2.5): **TANZANIA** REGION (2.6)**:EASTERN USAMBARA**

DISTRICT (2.7): DIVISION: **BUMBANI**

LATITUDE (2.9): **5 °5' 937 S** LONGITUDE (2.10): **38° 39' 681 E** ELEVATION:**1,397** **FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2. FARM**

No. OF SAMPLES (2.20): |__3__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.Backyard Cropping system: 1.Monoculture

2.Smallholding **2.1.Mixed cropping (mostly treecrops) coffee**

3.Midsize holding 2.2.Mixed cropping (mostly food crops) **4.Plantation**

CROPPING SYSTEM (2.8.2): 1.Monoculture 2. Mostly tree crops 3. Mostly food crops

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1**.Dessert 2.Cooking (Roasting)** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

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OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)**)**

BUNCH WEIGHT (2.30):I **SMALL** PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.**Valley** 4.Plateau 5.Upland 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4):

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland **3 Woodland** 4 Shrubland 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |__| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **ERECT** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): >**4 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **SLENDER** Number of suckers (6.2.9):

Pseudostem colour (6.2.3) **GLOSSY GREEN WITH SLIGHT BROWNISH RED**

Pigmentation of the underlying pseudostem(6.2.6): **DEEP PINK**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**) LARGE AMOUNT** Colour of midrib ventral surface (6.3.20):**PALE GREEN**

Blotches colour (6.3.2) **BROWNISH** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **MARGINS CURVED INIWARDS**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): Rachis position (6.4.12) **AT AN ANGLE**

Peduncle hairiness (6.4.5) **FINELY HAIRY** Rachis appearance (6.4.13)**: BARE**

Bunch position (6.4.6) **SUBHORIZONTAL** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10):**BISERIATE** Male bud shape (6.4.15) **LIKE A TOP**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8): **PROMINENT & PURPLISH**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9): **DISCONTINUE**

Colour of the bract external face (6.5.4): **RED** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **RED** Wax on the bract (6.5.13): **MODERATELY WAXY**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **SHORT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **LIGHT GREEN**

Free tepal appearance (6.6.8): **CORRUGATED** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: SLIGHT PRESENCE OF POLLEN**

FRUIT (6.7)

Hands**: 4**

Number of fruits (6.7.2):- 16 IN 2ND HAND Mature fruit peel colour (6.7.13) **YELLOW**

Fruit length (cm) (6.7.3): 4 **CM** Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **SLIGHTLY CURVED** Pulp colour at maturity:**CREAM**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **SLIGHTLY POINTED**

NB:Athers Pinkish

inibap-**IPGRI**
Collecting form for Banana (*Musa* spp)
CIRAD
***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**
EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION
COLLECTING No. (2.3): TME 16 PHOTOGRAPH No. **6?** (see footnote nr 7)

COLLECTING DATE (DD/MM/YYYY) (2.4) **17/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **edible AA** SUBSPECIES/SUBGROUP (1.5.4) **M'CHARE**

LOCAL/VERNACULAR NAME (2.16): **KAHUTI**

LOCAL LANGUAGE: **KISHAMBA** ETHNIC GROUP (2.17): **WASHAMBA**
COLLECTING SITE LOCATION
LOCATION NAME**: MAGUZONI**
SITE No. (2.2): **05** COUNTRY (2.5): **TANZANIA** REGION (2.6)**:WESTERN USAMBARA**

DISTRICT (2.7): **LUSHOTO** DIVISION:

LATITUDE (2.9): **4 °48' 087 S** LONGITUDE (2.10): **38° 17' 120 E** ELEVATION: **4744** **FEET**.asl
COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE
COLLECTING SOURCE (2.12): **2. FARM**

No. OF SAMPLES (2.20): |__**3**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)
Status of plantation: **1.Backyard** Cropping system: 1.Monoculture
2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture 2. Mostly tree crops **3. Mostly food crops**
POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal
---
OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)
1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)**)**

BUNCH WEIGHT (2.30):I **15 KG** PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain
---
SLOPE (°) (5.1.4):

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):
Grassland 2 Forbland 3 Woodland 4 **Shrubland** 5 Savanna 5 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |__| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **ERECT** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): **4.72 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9): **9**

Pseudostem colour (6.2.3) **BRIGHT GREEN WITH SLIGHT BLACK PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINK**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**) SMALL** Colour of midrib ventral surface (6.3.20): **GREEN**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22): **GREEN**

Petiole canal leaf III (6.3.3) **STRAIGHT WITH ERECT MARGINS**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **33 CM** Rachis position (6.4.12) **PENDULOUS**

Peduncle hairiness (6.4.5) **FINELY HAIRY** Rachis appearance (6.4.13)**: PERSISTENT BRACTS & FLOWERS**

Bunch position (6.4.6) **PENDULOUS** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10): **BISERIATE** Male bud shape (6.4.15) **LIKE A TOP**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2):**POINTED** Bract scars on rachis (6.5.8): **PROMINENT**

Bract imbrication (6.5.3): **IMBRICATE** Fading of colour on bract base (6.5.9) :**DISCONTINUE**

Colour of the bract external face (6.5.4): **RED-PURPLE** Bract behaviour before falling (6.5.12): **NOT REVOLUTE**

Colour of the bract internal face (6.5.5): **RED TO YELLOW** Wax on the bract (6.5.13) **SLIGHTLY WAXY**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **GREENISH YELLOW**

Free tepal appearance (6.6.8): **2 CORRUGATIONS & LONG TIP** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**: 12**

Number of fruits (6.7.2) **16 IN 2ND HAND** Mature fruit peel colour (6.7.13) **GREEN-YELLOW**

Fruit length (cm) (6.7.3):17 **CM** Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **SLENDER & CURVED** Pulp colour at maturity: **CREAM**

Transverse section of fruit (6.7.5) **ANGULAR** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BOTTLE-NECKED**

NB:Leaf length 260cm, width 90cm; Leaf bases auriculate, Leaves pale green, waxiness pronounced under the leaves. Upper sheaths waxy. Flowers inside the brac are half the length of the bract.

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 17 PHOTOGRAPH No. **3,4,5,36**

COLLECTING DATE (DD/MM/YYYY) (2.4) **17/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **edible AA** SUBSPECIES/SUBGROUP (1.5.4) **M'CHARE**

LOCAL/VERNACULAR NAME (2.16): **HUTI**

LOCAL LANGUAGE: **KISHAMBA** ETHNIC GROUP (2.17): **WASHAMBA**

COLLECTING SITE LOCATION

LOCATION NAME**: MAGUZONI**

SITE No. (2.2): **05** COUNTRY (2.5): **TANZANIA** REGION (2.6)**:WESTERN USAMBARA**

DISTRICT (2.7): **LUSHOTO** DIVISION:

LATITUDE (2.9): **4 °48' 087 S** LONGITUDE (2.10): **38° 17' 120 E** ELEVATION: **4744** **FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2. FARM**

No. OF SAMPLES (2.20): | **3** | TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: **1.Backyard** Cropping system: 1.Monoculture
2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture 2. Mostly tree crops **3. Mostly food crops**

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)**)**

BUNCH WEIGHT (2.30):I **12 KG** PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4):

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

Grassland 2 Forbland 3 Woodland 4 **Shrubland** 5 Savanna 5 Other

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SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **ERECT** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): **3.67 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9): 12

Pseudostem colour (6.2.3) **BRIGHT GREEN WITH SLIGHT BLACK PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINKISH**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**) NONE** Colour of midrib ventral surface (6.3.20): **GREEN**

Blotches colour (6.3.2) Colour of cigar leaf dorsal surface (6.3.22): **GREEN**

Petiole canal leaf III (6.3.3) **WIDE WITH ERECT MARGINS**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): 18 **CM** Rachis position (6.4.12) **PENDULOUS**

Peduncle hairiness (6.4.5) **FINELY HAIRY** Rachis appearance (6.4.13)**: PERSISTENT BRACTS & FLOWERS**

Bunch position (6.4.6) **PENDULOUS** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10) :**BISERIATE** Male bud shape (6.4.15) **LIKE A TOP**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2):**POINTED** Bract scars on rachis (6.5.8): **PROMINENT**

Bract imbrication (6.5.3): **DEEPLY IMBRICATE** Fading of colour on bract base (6.5.9): **DISCONTINUE**

Colour of the bract external face (6.5.4): **RED** Bract behaviour before falling (6.5.12): **NOT REVOLUTE**

Colour of the bract internal face (6.5.5): **RED** Wax on the bract (6.5.13) **SLIGHTLY WAXY**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19):**STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **YELLOW**

Free tepal appearance (6.6.8): **2 CORRUGATIONS & LONG TIP** Ovary pigmentation (6.6.23)**NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**: 10**

Number of fruits (6.7.2) **11 IN 2ND HAND** Mature fruit peel colour (6.7.13) **LIGHT GREEN**

Fruit length (cm) (6.7.3): **20 CM** Pulp in fruit (6.7.17): **PRESENT**

Fruit shape (6.7.4) **SLENDER & CURVED** Pulp colour at maturity: **ORANGE**

Transverse section of fruit (6.7.5) **ANGULAR** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BOTTLE-NECKED**

NB:Leaf length 227cm, width 78cm; Leaf bases auriculate. Anthers cream to white.
Bunch lax, Hands more open than in Kahuti. Bracts dehiscent but stick between flowers. Bract length 14cm.

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 18 PHOTOGRAPH No. **10-14,36**

COLLECTING DATE (DD/MM/YYYY) (2.4) **17/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4) **AAA s.l. ILALYI**

LOCAL/VERNACULAR NAME (2.16): **SU'U**

LOCAL LANGUAGE: **KISHAMBA** ETHNIC GROUP (2.17): **WASHAMBA**

COLLECTING SITE LOCATION

LOCATION NAME**: MAGUZONI**

SITE No. (2.2): 05 COUNTRY (2.5): **TANZANIA** REGION (2.6)**:WESTERN USAMBARA**

DISTRICT (2.7): **LUSHOTO** DIVISION:

LATITUDE (2.9): **4 °48' 087 S** LONGITUDE (2.10): **38° 17' 120 E** ELEVATION: **4744** **FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2. FARM**

No. OF SAMPLES (2.20): | **3** | TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: **1.Backyard** Cropping system: 1.Monoculture

2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee

3.Midsize holding 2.2.Mixed cropping (mostly food crops)

4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture 2. Mostly tree crops **3. Mostly food crops**

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking after has been made into Flour** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

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OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)**)**

BUNCH WEIGHT (2.30):I **12 KG** PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

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SLOPE (°) (5.1.4):

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):
1. Grassland 2 Forbland 3 Woodland 4 **Shrubland** 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **DROOPING** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): **3.89 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9): **16**

Pseudostem colour (6.2.3) **GREEN WITH INTENSIVE BLACK TO BRONZE PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINKISH**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**) SMALL** Colour of midrib ventral surface (6.3.20): **PINKISH**

Blotches colour (6.3.2) **BLACKISH BROWN** Colour of cigar leaf dorsal surface (6.3.22) :**GREEN**

Petiole canal leaf III (6.3.3) **ERECT MARGINS WITH WINGS**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **21 CM** Rachis position (6.4.12) **AT AN ANGLE**

Peduncle hairiness (6.4.5) **FINELY HAIRY** Rachis appearance (6.4.13)**: NUDE**

Bunch position (6.4.6**) AT AN ANGLE OF 45 °** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10): **BISERIATE** Male bud shape (6.4.15) **LIKE A TOP**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **POINTED** Bract scars on rachis (6.5.8): **PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9) :**DISCONTINUE**

Colour of the bract external face (6.5.4): **PURPLE-BROWN** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13) **SLIGHTLY WAXY**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **CURVED, SHORT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **GREEN**

Free tepal appearance (6.6.8): **BROADLY CORRUGATED**

TIP NOT DISTINCT Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**: 12**

Number of fruits (6.7.2) **18 IN 2ND HAND** Mature fruit peel colour (6.7.13) **YELLOW**

Fruit length (cm) (6.7.3): **21 CM** Pulp in fruit (6.7.17): **PRESENT**

Fruit shape (6.7.4) **SLIGHTLY CURVED** Pulp colour at maturity: **CREAM WITH STREAKS**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BLUNT**

NB:Leaf length 197cm, width 73cm; Leaf bases rounded to less auriculate. Fruit pedicels short. No wax on leaves. Flowers contorted in the bracts. Total length of bract length 20 cm. Fruit pulp slightly astringent. Middle axis of fruit curved. Flower length a seventh of bract length.

inibap-**IPGRI**
Collecting form for Banana (*Musa* spp)
CIRAD
***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**
EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION
COLLECTING No. (2.3): TME 19 PHOTOGRAPH No. **22,23**

COLLECTING DATE (DD/MM/YYYY) (2.4) **17/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4) **AAA-EA s.s.**

LOCAL/VERNACULAR NAME (2.16): **N' THEBWA**

LOCAL LANGUAGE: **KISHAMBA** ETHNIC GROUP (2.17): **WASHAMBA**
COLLECTING SITE LOCATION
LOCATION NAME**: MBULA VILLAGE**
SITE No. (2.2): 05 COUNTRY (2.5): **TANZANIA** REGION (2.6)**:WESTERN USAMBARA**

DISTRICT (2.7): **LUSHOTO** DIVISION:

LATITUDE (2.9): **4 °49' 093 S** LONGITUDE (2.10): **38° 18' 049** ELEVATION: **4,474** **FEET**.asl
COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE
COLLECTING SOURCE (2.12): **2. FARM**

No. OF SAMPLES (2.20): |__3__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)
Status of plantation: 1.Backyard Cropping system: 1.Monoculture
2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1. Monoculture 2. Mostly tree crops **3. Mostly food crops**
POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)
1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)**)**

BUNCH WEIGHT (2.30):I **10 KG** PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4):

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

1. Grassland 2 Forbland 3 Woodland 4 **Shrubland** 5 Savanna 6 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **DROOPING** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): **3.70 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9): **5**

Pseudostem colour (6.2.3) **GREEN WITH BLACK PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINKISH**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**) SMALL** Colour of midrib ventral surface (6.3.20): **GREEN**

Blotches colour (6.3.2) **BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **OPEN WITH MARGINS SPREADING**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **11 CM** Rachis position (6.4.12) **AT AN ANGLE**

Peduncle hairiness (6.4.5) **SLIGHTLY COARSELY HAIRY** Rachis appearance (6.4.13)**: PERSISTENT BRACTS & FLOWERS**

Bunch position (6.4.6) **AT AN ANGLE OF 45 °** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10):**BISERIATE** Male bud shape (6.4.15) **OVOID**

Rachis type (6.4.11):**PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **LESS POINTED** Bract scars on rachis (6.5.8): **PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9):**DISCONTINUE**

Colour of the bract external face (6.5.4): **PURPLE-BROWN** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13)**SLIGHTLY WAXY**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape (6.6.19): **STRAIGHT**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **GREEN**

Free tepal appearance (6.6.8): **FEW FOLDS** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**: 6**

Number of fruits (6.7.2) **15 IN 2ND HAND** Mature fruit peel colour (6.7.13) **GOLDEN YELLOW**

Fruit length (cm) (6.7.3): **14 CM** Pulp in fruit (6.7.17):**WHITE**

Fruit shape (6.7.4) **SLIGHTLY CURVED** Pulp colour at maturity**:WHITISH CREAM**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **ALMOST BLUNT**

NB:Leaf length 240cm, width 85cm; Under leaf slightly waxy.

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA MUSA EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 20 PHOTOGRAPH No. (2.25)

COLLECTING DATE (DD/MM/YYYY) (2.4) **17/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **????** SUBSPECIES/SUBGROUP (1.5.4) **AAA-EA**

LOCAL/VERNACULAR NAME (2.16): **IBWI**

LOCAL LANGUAGE:**KISHAMBA** ETHNIC GROUP (2.17): **WASHAMBA**

COLLECTING SITE LOCATION

LOCATION NAME**: MBULA VILLAGE**

SITE No. (2.2): **05** COUNTRY (2.5): **TANZANIA** REGION (2.6)**:WESTERN USAMBARA**

DISTRICT (2.7): **LUSHOTO** DIVISION:

LATITUDE (2.9): **4 °49' 093 S** LONGITUDE (2.10): **38° 18' 049** ELEVATION: **4,474** **FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2. FARM**

No. OF SAMPLES (2.20): |__**3**__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.Backyard Cropping system: 1.Monoculture

2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee

3.Midsize holding 2.2.Mixed cropping (mostly food crops)

4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture 2. Mostly tree crops **3. Mostly food crops**

POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)**) WEEDY**

BUNCH WEIGHT (2.30):I PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4):

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

Grassland 2 Forbland 3 Woodland 4 **Shrubland** 5 Savanna 5 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **DROOPING** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): **5.07 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **ROBUST** Number of suckers (6.2.9): **6**

Pseudostem colour (6.2.3) **GREEN WITH DEEP BLACK-BRONZE PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINKISH**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**) LARGE AMOUNT** Colour of midrib ventral surface (6.3.20): **GREEN**

Blotches colour (6.3.2) **BROWNISH- BLACK** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **OPEN WITH MARGINS SPREADING**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **60 CM** Rachis position (6.4.12) **AT AN ANGLE**

Peduncle hairiness (6.4.5) **COARSELY HAIRY** Rachis appearance (6.4.13)**: SEMI-PERSISTENT FLOWERS**

Bunch position (6.4.6) **PENDULOUS** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10):**BISERIATE** Male bud shape (6.4.15) **CORDATE**

Rachis type (6.4.11):**PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **ALMOST POINTED** Bract scars on rachis (6.5.8): **PROMINENT**

Bract imbrication (6.5.3): **NEARLY CONVOLUTE** Fading of colour on bract base (6.5.9):**DISCONTINUE**

Colour of the bract external face (6.5.4): **PURPLE-BROWN** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **ORANGE-RED** Wax on the bract (6.5.13)**SLIGHTLY WAXY**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM WITH 2 PRONOUNCED RIDGES**

Style shape(6.6.19) **Straight**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **FAINT CREAM**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **GREEN**

Free tepal appearance (6.6.8): **ONE FOLD** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**: 9**

Number of fruits (6.7.2) **18 ,2ND HAND** Mature fruit peel colour (6.7.13) ; **YELLOW**

Fruit length (cm) (6.7.3): **20 CM** Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **SLIGHTLY CURVED** Pulp colour at maturity**:WHITISH CREAM with brown streaks**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BOTTLE-NECKED**

NB: Anthers aborted. 2 outer lobes of the compound tepal longer than middle lobe. Free tepal tip very short. Cultivar like typical Musakala but it is very bitter and astringent

inibap-**IPGRI**

Collecting form for Banana (*Musa* spp)

CIRAD

***(NUMBERS BETWEEN PARENTHESIS REFER TO THE DESCRIPTORS NUMBERS IN THE MANUAL* "DESCRIPTORS FOR BANANA (*MUSA* SPP.)"**

EXPEDITION: **TANZANIA** **MUSA** **EXPEDITION**

COLLECTOR(S) NAME(S)/INSTITUTE(S) (2.1): **INIBAP/HORTICULTURE RESEARCH INSTITUTE, TENGERO, ARUSHA, TANZANIA**

ACCESSION IDENTIFICATION

COLLECTING No. (2.3): TME 21 PHOTOGRAPH No. **17,18**

COLLECTING DATE (DD/MM/YYYY) (2.4) **17/07/2001**

GENUS (1.5.1): **MUSA** SECTION (1.5.2): **EUMUSA**

SPECIES/GROUP (1.5.3): **AAA** SUBSPECIES/SUBGROUP (1.5.4) **AAA-EA s.l. ILALYI**

LOCAL/VERNACULAR NAME (2.16): **MHA'A-HA'A**

LOCAL LANGUAGE:**KISHAMBA** ETHNIC GROUP (2.17): **WASHAMBA**

COLLECTING SITE LOCATION

LOCATION NAME**: MBULA VILLAGE**

SITE No. (2.2): 05 COUNTRY (2.5): **TANZANIA** REGION (2.6)**:WESTERN USAMBARA**

DISTRICT (2.7): **LUSHOTO** DIVISION:

LATITUDE (2.9): **4 °49' 093 S** LONGITUDE (2.10): **38° 18' 049** ELEVATION: **4,474** **FEET**.asl

COLLECTING SITE ENVIRONNEMENT AND COLLECTED SAMPLE

COLLECTING SOURCE (2.12): **2. FARM**

No. OF SAMPLES (2.20): |__3__| TYPE OF SAMPLE (2.14): **1.Sucker** :

STATUS OF SAMPLE (2.15): 3. **Landrace**

CULTURAL SITUATION (2.18)

Status of plantation: 1.Backyard Cropping system: 1.Monoculture
2.Smallholding 2.1.Mixed cropping (mostly treecrops) coffee
3.Midsize holding 2.2.Mixed cropping (mostly food crops)
4.Plantation

CROPPING SYSTEM (2.8.2): 1.Monoculture **2. Mostly tree crops** 3. Mostly food crops POPULATION DENSITY (2.21): I____I

USES OF THE FRUIT (2.22): 1.Dessert **2.Cooking** 3.Beer/brew/wine 4.Animal feed 5.Medicinal

---

OTHER PARTS OF THE PLANT USED (2.23) AND USES OF THESE PARTS (2.24)

1.Leaves: 2.Pseudostem: 3.Male bud:

NOTES: PREVAILING STRESSES (2.27)**) WEEDY**

BUNCH WEIGHT (2.30):I PLANT CROP CYCLE (2.31) :

HIGHER LEVEL LANDFORM (5.1.2) 1.Plain 2.Basin 3.Valley 4.Plateau **5.Upland** 6.Hill 7.Mountain

---

SLOPE (°) (5.1.4):

CROP AGRICULTURE (5.1.6): 1 Annual field cropping 2 Intermediate 3 **Perennial**

OVERALL VEGETATION SURROUNDING AND AT THE SITE (5.1.7):

Grassland 2 Forbland 3 Woodland 4 **Shrubland** 5 Savanna 5 Other

---

SOIL pH (5.1.14): SOIL FERTILITY (5.1.20): |___| (code: 3=Low ; **5=Moderate** ; 7=High)

SOIL EROSION: 1 **Low** 2 Intermediate 3 High

WATER AVAILABILITY (5.1.19): **1.Rainfed** 2.Irrigated 3.Flooded 4.River banks 5.Sea coast 6.Other (specify):

POST-MOVEMENT ACTIVITIES DATA (2.28)

Treatment of sample during the mission (3.8.1): **CORM PARING**

Destination of the accession (3.8.2): **HORTICULTURE RESEARCH INSTITUTE, TENGERO, TANZANIA**

CHARACTERIZATION MINIMUM DESCRIPTORS

PLANT GENERAL APPEARANCE (6.1)

Leaves habit (6.1.1): **DROOPING** Dwarfism (6.1.2): **NORMAL**

PSEUDOSTEM/SUCKERS (6.2)

Pseudostem height (m)(6.2.1): **3.30 M** Sap colour (6.2.7):**MILKY**

Pseudostem aspect (6.2.2): **SLENDER** Number of suckers (6.2.9): **4**

Pseudostem colour (6.2.3) **GREEN WITH LIGHT-BRONZE PIGMENTATION**

Pigmentation of the underlying pseudostem(6.2.6): **PINKISH**

PETIOLE/MIDRIB/LEAF (6.3)

Blotches at the petiole base (6.3.1**) LARGE AMOUNT** Colour of midrib ventral surface (6.3.20): **RED**

Blotches colour (6.3.2) **BRONZE** Colour of cigar leaf dorsal surface (6.3.22):**GREEN**

Petiole canal leaf III (6.3.3) **WIDE WITH ERECT MARGINS**

INFLORESCENCE/MALE BUD (6.4)

Peduncle length (cm) (6.4.1): **20 CM** Rachis position (6.4.12) **PENDULOUS**

Peduncle hairiness (6.4.5) **FINELY HAIRY** Rachis appearance (6.4.13)**: BARE**

Bunch position (6.4.6) **PENDULOUS** Male bud type (6.4.14) **NORMAL**

Fruits (6.4.10): **BISERIATE** Male bud shape (6.4.15) **LANCEOLATE**

Rachis type (6.4.11): **PRESENT**

BRACT (6.5)

Bract apex shape (6.5.2): **ALMOST POINTED** Bract scars on rachis (6.5.8): **PROMINENT**

Bract imbrication (6.5.3): **CONVOLUTE** Fading of colour on bract base (6.5.9):**DISCONTINUE**

Colour of the bract external face (6.5.4): **RED-PURPLE** Bract behaviour before falling (6.5.12): **REVOLUTE**

Colour of the bract internal face (6.5.5): **RED WITH YELLOW IN THE SIDES**

MALE FLOWER (6.6)

Compound tepal basic colour (6.6.2): **CREAM** Style shape(6.6.19) **SLIGHTLY CURVED**

Compound tepal pigmentation (6.6.3): **NONE** Stigma colour (6.6.20): **ORANGE-YELLOW**

Lobe colour of compound tepal (6.6.4): **YELLOW** Ovary basic colour (6.6.22) **GREEN**

Free tepal appearance (6.6.8): **ONE FOLD** Ovary pigmentation (6.6.23) **NONE**

(or presence of pollen**: NONE**

FRUIT (6.7)

Hands**: 6**

Number of fruits (6.7.2) **10 ,2ND HAND** Mature fruit peel colour (6.7.13) ; **YELLOW**

Fruit length (cm) (6.7.3): **20 CM** Pulp in fruit (6.7.17):**PRESENT**

Fruit shape (6.7.4) **SLENDER** Pulp colour at maturity**: WHITISH CREAM with brown streaks**

Transverse section of fruit (6.7.5) **ROUNDED** Presence of seed (6.7.23): **NONE**

Fruit apex (6.7.6): **BLUNT**

NB: Anthers pinkish. One stamen , rest aborted. Bunch lax with glossy fruits. Pulp centre not straight but crooked. Fruit slightly astringent.

ANNEX 2

Alphabetical List of the Observed Cultivars

Name	Region	Group
Huti	Usambara	M'chare
Ibwi	Kilimanjaro	AAA-EA s.s.
Ifwanaya	Kilimanjaro	AAA-EA s.s.
Ilalyi 'green'	Kilimanjaro	Ilalyi
Ilalyi 'red'	Kilimanjaro	Ilalyi
Ilalyi nduuya	Kilimanjaro	Ilalyi
Ilalyi	Kilimanjaro	Ilalyi
Imanri[4]		
Inanambo	Kilimanjaro	AAA-EA s.s.
Kahuti	Usambara	M'chare
Kisangamachi	Usambara	Putative diploid
Kisukari usini guse	Usambara	Putative diploid
Kitarasa	Kilimanjaro	Ilalyi
Llelembwa	Kilimanjaro	M'chare
M'chare	Kilimanjaro	M'chare
M'dole	Usambara	M'chare
M'lali[5]	Kilimanjaro	Ilalyi
M'lema	Usambara	Ilalyi
Madjugu	Kilimanjaro	M'chare
Mbo	Kilimanjaro	AAB Plantain (French-)
Mboko	Usambara	Ilalyi
Mbwe	Kilimanjaro	AAB Plantain (French-)
Mha'aha'a	Usambara	Ilalyi
M'hoye	Usambara	AAB Plantain (French-)
Mhoyo[6]	Kilimanjaro	AAA-EA s.s.
Mkono wa tembo[7]	all regions	AAB Plantain (Horn-)
M'nyenyele	Kilimanjaro	Ilalyi[8]
M'nyerere	Pare	Ilalyi[9]
Mpighiti	Usambara	Ilalyi
Ndishi	Kilimanjaro	AAA-EA s.s.[10]
N'shonowa	Kilimanjaro	M'chare
N'thebwa	Usambara	AAA-EA s.s.
N'tindii 1	Usambara	AAA-EA s.s.?
Nduuya	Kilimanjaro	M'chare[11]
Ngumadu	Kilimanjaro	M'chare
Ntindii 2	Usambara	Putative diploid
Shumba nyeelu	Usambara	M'chare
Su'u	Usambara	Ilalyi

[4] Is reported as the Kitarasa in the extreme Western dialects of Chaga (G.Phillipson, *op.cit*)
[5] The name stands for the whole Ilalyi-group in Central-and eastern Chaga dialects.
[6] Said to be the Inanambo in Eastern (Rombo) dialects of Chaga.
[7] This is a kiSwahili name. No local name could be offered by the farmers, which would point to a separate introduction of the Horn Plantain in these areas.
[8] The name is used in the Central-and Eastern Chaga dialects, and stands for the basic Ilalyi-type. Not to be confounded with M'raru in Kenya (Gikuyu area) which is a M'chare (Sebasigari, 1992).
[9] The team noticed the name for this cultivar (or entire group?) during short visit to the South Pare Hills (see Progress report in Annex 3, and also Annex 4)
[10] Is the Inanambo in Central-and Eastern Chagga dialects.
[11] Also called: M'chare nduuya, meaning: 'the M'chare with short fingers'. Another 'nduuya' is: 'Ilalyi nduuya'.

ANNEX 3

Back to office report of the "Tanzania *Musa* Expedition 2001"

July 8TH – 20TH, 2001.

by Deborah Karamura

Objectives:

- Explore and determine the current diversity found in the North East mountain ranges of Kilimanjaro, Usambara and Pare.
- Determine and collect any possible new banana varieties particularly diploids(AA), that are not yet found in Musa Germplasm collections
- Discuss and agree on the Establishment of the collected materials.
- Report Findings of the Expedition.

Introduction. Pre-exploration Activities

On the 8th of July, 2001 Dr. Mbwana, Professor De Langhe and I agreed to discuss the pre-exploration activities of the *Musa* expedition in the North and East mountain ranges of Tanzania. The three of us constituted the expedition team to the mentioned areas. The objective of the discussions were to map out routes for the expedition project **and to agree on our activities during the visits to the fields**.

Tentative Programme

Through our discussions a tentative programme was drawn based on the following arrangements.

8th July, 2001
Arrival of Professor De Langhe and Deborah Karamura from Entebbe to Arusha.
Discussion of the Programme of the Expedition Team

9th July, 2001
Purchasing and collecting materials and equipment for the expedition.
Courtesy call to relevant Administrators to introduce the expedition team
Discussion of the working document

10th – 11th July, 2001
Explore Kilimanjaro areas

12th July, 2001
Visit Moshi area

13th July, 2001
Travel to Usambara region

14th – 16th July, 2001
West Usambara, Lushoto district

17th July, 2001
Amani and East Usambara

18th July, 2001
Pare areas
Back to Arusha

19th July, 2001
Revisit Kilimanjaro areas to make final clarifications with cultivars in Kilimanjaro and Usambara
Final discussions and drafting of major factors of the report.

20th July, 2001
Prof. De Langhe and Dr. Deborah fly back to Entebbe, Uganda.

Purchasing Material (9th July, 2001)

Dr. Mbwana purchased the necessary materials on the 9th of July, 2001. He was also able to borrow kitchen knives, pangas, machetes and a hoe from his research Institute. All the necessary materials and equipment were ready by 10th July for the expedition to begin.

Meeting with the Regional Administrative officer

Before the expedition could begin, it was necessary to introduce the expedition team to the relevant administrators within the region. Because, it was a day of mourning for the late Vice- President of Tanzania, relevant administrators in Arusha were not available. The team was then taken and introduced to the Regional Administrative officer for Kilimanjaro Region, Mr. J. M. Kasori in Moshi, who welcomed the team.

The regional administrator was pleased to hear that there was a team ready to continue work which our predecessors did not complete. He emphasised the need for a follow up on so many pieces of work and he noted that many researchers no longer pursue their work in that systematic manner. They would rather start things afresh without consulting history. He urged the team to use history as their background information to be able to continue with the work which had started earlier. The Regional administrator wished the team a successful expedition.

Discussion of the working document and Objectives of the field visits.

On the 9th of July, 2001, the expedition team met to discuss and make further clarifications on the objectives and hypothesis outlined in the working document of the expedition (Annex 4). This document had been sent earlier by Professor De Langhe to the members of the team, and allowed for setting up the practical objectives, in line with the general ones.

It was clarified that the principal objective of the banana cultivar prospection in the North East of Tanzania was to collect AA cultivars which were not yet in *Musa* Germplasm collections and would be important in the banana breeding in East Africa.

The next objective was to clarify as far as possible the rather obscure taxonomic status and nomenclature of the cultivars in the areas to be visited, and more specifically to compare them with the well-known highland banana cultivars of the Great Lakes region.

The third objective was to verify the hypothesis that more or less domesticated AAs entered Africa and that some of them were the possible originators of the triploid highland bananas in East-Africa, the African farmers thus having been their architects.

To that end, the working document also consisted of cultivar names of the region to be visited which needed clarification about their origin and language. In order to clarify these names and to prove our hypothesis, it was necessary to be briefly documented about the history of the migrations of different tribes in this region, which part of the history was also in the working document.

Throughout the expedition, it was necessary to have the objectives above in mind and to interview and participate with farmers knowing what to achieve.

By the end of the discussion, each team member was equipped with the necessary information to complete the expedition successfully.

It was agreed therefore that the following procedures should be used when the team visits or discusses any farmer or during the expedition.

Procedures followed on each farm

- Farmer lists down all cultivars on his field
- Team checks farmer's list against theirs.
- Team critically studies the phenology of the cultivar?
- Farmer shows team selected cultivars and provides the language of the name.
- Team analyzes the etymology of the name of the selected cultivar.
- Team makes decision to collect the accessions.
- Team photographs the accession and relevant parts
  - Describes the accession and gives it a number
- Record coordinates
- Uproot, label 3 suckers per accession
- Put each collected accession in its gunny bag
- Label the bag.

1. Kilimanjaro Region: Machame area (10th-11th July)

Machame was the first area visited by the team. The team was introduced to Dr. Edward Uliky, the Hai district agricultural and livestock officer who welcomed them. Dr. Mbwana spelt out the objectives of the expedition, and the Livestock officer responded by wanting to know how the expedition can assist in the banana improvement

programme. The team explained that if there still existed diploids of Highland bananas, then it would be easier to use them in breeding programmes to produce resistant genotypes against diseases.

Finally, the Livestock officer wished the team a successful mission and gave them Michael Kisaka, the District extensionist to assist the team in exploring the Machame area.

Farmers visited and interviewed

- Robinson Mwanga, Roo village
- Habiba Amin Mbowe, Uduru village
- Catherine Invocant Mbowe

Cultivars collected

- 1fanaiya from Roo village
- 1lalyi from Uduru village
- Mshare – Madjungu(1) from Uduru village
- Mshare –Madjugu(2) from Uduru village
- 1nanambo from Uduru village
- Msahre – Llelembo from Uduru village

2. Kilimanjaro Region: Kibosho Area (12th July)

In Moshi, the team visited Moshi district offices where one extensionist was collected to assist in exploring Kibosho area.

Farmers visited and interviewed

- Beda Swai, Kombo village
- Ade Justin, Kimanganori village
- John Mushi, Kimanganori village
- Gerald Tarim, Ongoma village
- Mary Deogratiusus Urio, Ongoma village

Cultivars collected

- Nshonowa, Kombo village
- Ilali, Kimanganori village
- Kitarasa, Ongoma village
- Kisukari Usiniguse, Ongoma village

3. Usambara Area

On the 13th of July, 2001, the team moved to Usambara region and were introduced to the Lushoto district agricultural and Livestock District officer, Mr T. M. A. Kizuguto. Mr Kizuguto briefed the team about the history of Lushoto district, the people found in the region and the crops grown. He also briefly talked about the banana crop in the area particularly how the farmers had prepared areas for new banana hybrids. Mr. Kizuguto welcomed the team and encouraged them to look through his district and see how the

banana crop can be improved in the region. Mr. Kizuguto introduced Ms. Mary Rimoy, the horticulturist at the district to accompany the team. Dr. Mbwana had also requested Mr. Godfrey Matosho an extensionist and horticulture person from the CIAT programme to assist in mapping locations to be visited.

West Usambara: Bumbulu division (15th & 17th July)

Farmers visited:

- Lernad Salehe – Mbokoi Village
- William Manya – Kwalei Village
- Frank Lelwa – Maguzoni Village
- Mwana Idi – Mbula Village
- Idi Shehemba – Mbula Village

Cultivars collected:

- Ntindii (1), Mbokoi Village
- Shumba, Nyeelu (Huti), Mbokoi village
- Mlewa, Kwalei Village
- Ntebwa, Mbula Village
- Ibwi, Mbula Village
- Haahaa, Mbula village
- Kahuti, Maguzoni village
- Huti, Maguzoni Village
- Suu, maguzoni Village

East Usambara (16th July)

Farmers visited:

- group of farmers at Bumbari and Amani.

Cultivars collected:

- Ntindii (2)
- Kisangamachi

4. Pare Mountains (18th July)

On the 18th July , the team travelled back to Arusha but passing through the Pare Mountains. There was not enough time to survey fully the Pare area. However, the District Agricultural and Livestock Development Officer, Dr. Osanga Eliesika Petru selected an area in Pare where there were old cultivations of bananas. Ntenga Village in the Pare Mountains was visited and Godfrey Mavoa from the village, guided the team to the banana forests in the valleys. The original cultivar of the place called Mnyelele was studied but not collected, since it was considered the same as Ilali. Farmers in this area were growing some new banana introductions, but leaving their original banana down in the forests.

5. Visit to the Tengeru Horticulture Research Institute: (19th July)

On the morning of the 19th of July, Dr Mbwana took and introduced the team to the Director of Tengeru Horticulture Research Institute, Dr A. A. Mgonja. It was important to visit the institute because this was the place where the collected germplasm was to be established. The Director of the station was happy to receive the team and assured the team of the safety of the place and the germplasm which was to be planted. The team was also introduced to Mr. Njau Samali, the field assistant, who was to take care of the germplasm.

Dr. Mbwana took the team to the banana department where he introduced the rest of other members of the department. Dr. Mbwana later took the team to his Zonal Office station where the team was to be in contact with him.

Final Discussions:

The team held final discussions and agreed that Professor De Langhe and I would write the different parts of the report. A copy would then be sent to Dr Mbwana who would respond by filling in the gaps and correcting what might not be fitting. Dr. Mbwana would then send the copies back to the team for final write up. The following parts of the report were to be written:

The executive summary

- Foreword
- Introduction
- Accessions:
- Classification
  - Establishment
  - Revisiting
- Significance
- End uses
- Recommendations
- Epilogue
  - Collection/ ITC
  - Field collections at Tengeru
  - Field visit
- Annexes
  - Descriptors with germplasm collected
  - Programme of the expedition

Notes:
During the redaction of the general report of the Expedition, it was agreed that the following items were to form part of two major Chapters: Accessions, Significance, End uses, Epilogue. The two Chapters having the titles: 1. Identification of the cultivars. Implications; 2. Management and Utilization Practices.

The team was later to agree on three possible papers to come out of the expedition and the report to be ready by early August.

ANNEX 4

ON CULTIVARS IN N.E.TANZANIA.

Testing a Hypothesis

May 2001

Introduction

This is a working document to be shared with Dr.Deborah Karamura and Dr. A.Mbwana.

We are preparing the Banana Expedition in N.E.Tanzania of which the principal Objective is to collect AA-cultivars that are as yet not in *Musa* Germplasm Collections and may be important for Banana breeding in East-Africa. [12]

The ***Hypothesis*** behind this operation: *more or less domesticated AA entered the continent and some of them are at the origin of the Highland AAA bananas (*tooke *and* mbidde*), the EA-AAA. If the hypothesis is correct, the* ***African farmers were the architects of the current EA-AAA.***

Testing the hypothesis is crucial because of the implications:

If correct, then
(1) the said AA were introduced at a *remote time;*
(2) they actually are a vital source of *desirable characteristics* (flavour, bunch/finger forms,post-harvest manipulation and others) in genetic improvement of the EA-AAA and
(3) the history of the banana in Africa can be clarified for a great deal (with consequences insight of what *sustainable agriculture* can be envisaged).
If false , then
(1) one must accept that EA-AAA cultivars were introduced 'as such' ,
(2) at a much later time and
(3) that Bantu farmers integrated them in their agricultural system, with again practical consequences concerning *sustainable agriculture*.

Although we expect to find the 'new' AA's preferably in the Usambara Hills, the Chagga area is a key because of its more intermediate position between the coast and the Great Lakes (see next item). The cultivars in this area have been 'visited' and reports of studies on the Chagga and on their agriculture are available.[13]

Hereby:

a) an extensive development of the AA-Hypothesis;

[12] About the objectives, cfr the Offical Proposal

[13] A very deep study, unfortunately in French and thus rarely consulted (overlooked by C.Ehret for example!) is "*Gens des Bananeraies"* by the linguist Gérard Philippson (1984, 314pp).

b) the explanation of how the Expedition can benefit from a thorough and multidisiplinary exploration of the Chagga cultivars before visiting the Usambara Hills.

The AA-Hypothesis

1. The plausible Pathway

If AA 'cultivars' arrived at the coast, their penetration in the continent went most likely along the rain-fed slopes of the 'Usambara-Pare-Kilmandjaro-Meru' mountain range. By the time they reached the current Chaga area[14], the first EA-AAA (hardier…) would have been generated and diffusion towards the Great Lakes (across harsher climate conditions and via the Central Kenya Highlands) became possible. Many more fragile AA were thereby lost 'underway'.

A ***first*** question practical rises: did AAB-Plantains form part of this initial 'package'? We could find an answer![15]

2. The People of the mountain range

It is generally agreed that:

- the original people were 'hunter-gatherers' of the *Khoisan*-type;

- the agri-pastoral Southern *Cushitic* speaking people came from 'the North' and thrived on the more open places where they cultivated cereals mainly and held cattle (apparently an early non-zebu-like stock, now disappeared);

- *Nilotic* speaking people (Nilo-Saharians) arrived in several waves and settled with their cattle on the plains. But some of them (the Arusa e.g.) later on adopted the Bantu agricultural mode of existence;

- the *Bantu* speaking people arrived about 2000 years ago and settled by preference in the more humid places, thereby pushing many S.Cushitics into more steppe-places. They dominate since many centuries on the mountain range, in a long SE to NW band with, from the coast on: *Bondei, Shambaa, Pare* (*Gweno* ands *Asu*), *Chagga* (and *Tubeta*+*Taita* to the East of Kilimanjaro).

They had originally been yam-growers (a thousand years earlier, when they reached the eastern side of the rainforest), but had integrated cereal-growing and livestock during their expansion in East-Africa (see details in next item). These were already farmers with all the potential for the current mixed-agriculture in the Chagga area and nearby.

Consequently, the Bantu were in all evidence the only people who could have been interested in Asian vegetatively propagated crops (such as the Asian yam, the taro and the banana) when these arrived at the coast.

[14] I.e. well before the Chagga settled there!
[15] If they were, then several plantain cultivars should still be detected along the mountain range.

However, rather systematically overlooked in all this has been *the existence in the past of people that were neither 'hunter-gatherers', nor farmers or pastoralists.*

While the very hunter-gatherers of the steppe are called '*wasi*' by the Bantu speakers over a large portion of East-Africa[16], these other people had quite different names among the Bantu: *βakoniŋgo* (Chagga), *βataɾimba*[17] (Machame), *siβira* (Gweno, Asu), *gumba* (Gekoyo). They 'disappeared' (probably absorbed) but it has been recorded (STAHL, SCHANZ) that the first Bantu settlers met these 'little men' who, according to some sources lived in caves and 'escaped in the forest and nevermore re-appeared'. But other sources (SCHANZ in Machame, 1913) told that *these people had cattle and banana fields.*

One thus can presume the co-existence (more than 2000 yrs BP) of hunter-gatherers in the steppe, and semi-agriculturists in the more humid areas. *It is this latter stratum of people that could give a solution for the mysterious move of AA-bananas in the past*, as will be shown in item (4).[18]

Hence a ***second*** practical question: are some generic/cultivar names (and dealing with the banana) dating from pre-Bantu times?[19] The answer may be: YES (see further) but care-full registration of names is of utmost importance for their subsequent linguistic study.

3. The history of the Bantu in Tanzania-Kenya

Since the AA-Hypothesis rejects the concept of the Bantu as the first banana growers, and because the Bantu were in the area since 2000 years, their history has to be taken into account, if the hypothesis is to be substantiated.

C. Ehret has reconstructed the early history of the Bantu in eastern Africa (see his "An African Classical Age", 1998). He based the construction mainly on linguistic grounds (Schoenbrun; Nurse). I see no reason to reject his rather daring hypotheses, even if I do not accept his view on banana-history in the continent (we can discuss this later).

According to Ehret, the ancestors of all the 'Eastern Bantu' came from the West (rather along the southern savanna-rainforest boundary, but this path is not elaborated upon), and settled first in the Western Rift Valley (mainly between Lake Ruiru –ex Edward- and Lake Tanganyika) about 1000 BC. He calls them the Masharaki. The Northern branch of the Masharaki, called the 'Kaskazi', progressively expanded to the South of Lake Victoria. By 500 BC a Northern branch of the Kaskazi became the ancestors of the 'Lake'-people (the current population between the W. Rift valley and L.Victoria) while a Southern branch split into two major clusters: a group that went South and a group (the

[16] Phonology: *βasi* in Chaga, *a:θi* in Gekoyo, *washi* in Shambaa. The Maasai call them *il-tórrobo*. The survivors are called Aramanik or Asax in Chaga area.

[17] The 'ɾ' stands for the typical (semi-guttural?) 'r' common in Chaga and used in the generic name for banana= *iɾu'u*. Correct phonology is cumbersome and the rest of this text will avoid it when possible.

[18] Several legends among the Bambuti (the pygmees of the NE.Congo rainforest zone) refer to people that had bananas (False-Horn plantains) and which were there before the arrival of the Soudanese speakers (SCHEBESTA).

[19] Linguists detect such names by the unusual reflexes and the lack of cognates in other languages.

'Southern Nyanza') which progressively moved/expanded from the SW- to the SE areas of the Lake (500-300 BC).

This latter subgroup is at the origin of all the Bantu now settled in Kenya and N.Tanzania between Lake Victoria and the Coast. The subgroup moved Eastwards (300-0 BC) in different directions. The clusters of interest for us are:

- the 'Upland' Bantu, who were the first to occupy the highlands in Kenya and NE Tanzania and who eventually reached the coast. They are the ancestors of all the current 'upland' Bantu (those of the NE.-Tanzania mountain range as well as the *Kikuyu*, *Kamba*, *Taita* in Kenya). Archaeological attestation is the 'kwale' ware;

- the 'Kati' , who reached the coast more to the South and then moved northwards, along the coast and up to even Somaliland. They eventually dislodged the Uplands from the coast and are the ancestors of the original Swahili-speaking ('Sabaki') people. Archaeological attestation is the 'Tana' ware which indeeds seems to replace the 'Kwale' in those critical places.

This period of settlement and re-settlement is placed around the beginning of the Christian era.

During the entire millenium BC, all these people and their ancestors came in close cultural contact with subsequently: Central-Soudanese, Nilo-Saharian and S. Cushitic speaking people, contacts that left deep traces in their way of subsistence and vocabulary.

But the lexicon would not have any term for 'banana' on arrival. It is that fact which leads 'mainstream' scientists to neglect the possibility of an early presence of banana in the area.

4. The first Banana growers

The first Bantu settled in the area not before 2000 years before present (BP). Following the mainstream concept, they would have reached the coast before the arrival there of the banana. These bananas would already have to be the EA-AAA, which boils down to reject the AA-hypothesis[20].

The mainstream research, coming to the conclusion that Bananas must have come in Africa some time during the first centuries AD, opts for 'Indonesian' people (those that also arrived in Madagascar about 5th century) which would have 'touched' the African coast, or for 'Indian' influence (Ehret, Rossel).

The AA-hypothesis, however, advances that the AA's may have moved from the coast in more remote times (somewhere during the 1st millenium BC.), when S.Cushites were in

[20] Indeed, if that would have been AA's only, the generation in a short time of the triploids becomes a difficult hypothesis. Only a couple of centuries afterwards, the first EA-AAA certainly were grown in the Great Lakes region (SCHOENBRUN). This presupposes (1) a rather fast 'move' across the East-Africa Rifts[20] and (2) a fast generation of triploids[20]. We have to reject that 'possibility' for genetic reasons.

the region. But these were cereal-growers and can hardly be seen as instrumental in the banana (plus tuber-) cultivation. The pastoral Nilotics are of course out of the question. [21]

But if one 'digs up' the existence of semi-agriculturists such as these Wakoningo *of the Chaga, then one can accept that <u>these</u> people were the very actors in the move of the AA's, during the first millenium BC.*

Since these people lived on the humid side of the mountain range, where a continuum of *Ensete* was a fact, they were familiar with corm-manipulation (for food) and would rapidly have grasped the significance of the banana- and taro suckers (see more in my above-mentioned paper and chapter).[22]

Most unfortunately both the linguists and the archaeologists are not studying the traces of these people. Perhaps our study may be of help.

Hence the ***third*** question: can some cultivar names point to a pre-Bantu but non-Cushitic lexicon?[23] [24]

5. The Core of the AA-Hypothesis

The hypothesis in its essence looks as follows:

a) the first Bantu were not familiar with the Banana [25] when they reached the NE.Tanzania mountain range and the Kenya highlands;
b) they now use a nomenclature for bananas (generic and specific) as well as a connect cultural vocabulary that is confined to this particular area;
c) these terms are <u>not</u> innovations[26]. Which rules out the possibility of a later arrival of the banana in the area (e.g. from the coast, where it was brought by 'Indonesians' (vide

[21] The question of 'who brought them on that coast' and when, is dealt with in my Cambridge paper (in Azania) and in my Chapter 20 of 'The Prehistory of Food'. I can only suppose that Austronesian people would have visited the coast about 3000 years from now. Which is well before first Bantu arrival…

[22] *Ensete ventricosum* still is a sacral plant among all the traditional Bantu clans in East-Africa. The Chaga call it *isangaruu* (-SANGA+RUGU) = 'the banana of the country'…(mind: not = the 'wild' banana! but rather 'our banana')

[23] In the Conclusion of his thorough linguistic study on Chaga, Gérard Philippson comes to the following question (I translate):
Did the Bantu speakers, who afterwards generated the Chaga dialects, encounter on the Kilimanjaro an agricultural people already familiar with 'South-Asian' crops or
did they got these crops from coastal people (whoever these were) and did they manage to grow them on altitude?
And he insists on the bare need of a search for the origin of a complete cultural lexicon, not existing in Common Bantu (not even in the Great Lakes languages), a lexicon typical for these 'mountain Bantu' in Tanzania and Kenya, which can as yet not be attributed to any of the African languages studied so far.

[24] We have a great opportunity here, in that Dr.Mbwana is familiar with Shambaa and can compare with Dr Deborah Karamura's extensive knowledge on the names in Uganda, for the same cultivars. I promise to keep quiet and to take notes… Any cultivar name in Chaga or Shambaa of which the etymology can not be explained (even not with the help of the growers) should be a serious 'indicator' of that previous language.

[25] they probably knew *Ensete*

EHRET and others) for which the Bantu otherwise would have 'invented' new terms on the base of their available lexicon;
d) the terms do not seem to be loanwords either from any of the proximal non-Bantu languages as yet studied[27]. Which rules out the possibility that S.Cushites or Nilotics or the Wasi hunter-gatherers would have been familiar with the crop (their mode of existence is not compatible with the crop either);
e) there thus remains the possibility that the terms were 'loaned' from another people's language which has as yet not been studied. The now vanished existence of such people is indicated at several places (cfr the Wakinongo in Chaga for example)
f)conclusion: the banana (*in casu* the AA's) arrived before the Bantu settlement, and were semi-cultivated since perhaps 1000 BC by this people in the mountain range. The same people semi-cultivated other (vegetatively propagated-) crops of 'SE.Asian' origin: asian yam, taro, and perhaps sugarcane (sago was dropped)[28]

6. The 'rest of the story' (according to the AA-hypothesis)

Once the Upland Bantu generated the EA-AAA (perhaps in the very Chaga area), these hardier triploids were carried across steppe to the Central-Kenya Upland Bantu (Kikuyu) and thence further to the West (cultural contact at that period was most likely), where the rainforest covered the northern fringes of the Lake Victoria. The Lake people eventually adopted the triploids (the 'Kintu'-legend) with the cultivar explosion as spectacular result.

Cultivar names in Chagga

I refer to 'Table 1. and Comments' also attached to the present message. Apologies for the German terms: I preferred to reproduce them as such because so meaningful as 'indicators'. The extensive list of bib. sources can be provided on request.

I noticed that the end-use of several cultivars (esp. 'cooking' versus 'roasting' versus 'food for cattle/goats') differs from dialect to dialect. We will have a *job* to find common denominators here (can lead to original uses).

Some additional questions.

An important *question*: are the *mshare*'s of the Chaga really the same as the *huti* of the Shambaa? Another major *question*: do the *boko* of the Shambaa correspond with any of the Chaga-clusters? Then there is the complex *question* of the composition of the clusters: do we find the same sort of composition with the Shambaa? If not: how are they different?

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[26] If they were, they should have been developed from the proto-language of the Kaskazi (EHRET definition), and be derived from Common Bantu terms, which is clearly not the case (see G.Philippson)
[27] Although the generic name *–ru'u* has previously been considered as a loan from Iraqw (S.Cushitic) by the same EHRET…
[28] Even if these crops existed in the region where S.Cushites, Wasi and Nilotics lived, they would have no meaning for these people: they were totally absent in the landscape familiar to them. And the Bantu, who evidently would have been interested in these crops, had never been in contact with them before they reached the mountain range...

These and probably further -but similar- *questions* are rather part of a Comparative Study 'Chagga-Shambaa' with the aim (among others) *to figure out if and how the supposed original 'move' of AA's* (and already EA-AAA's?) *proceeded.*

For example:

- if Chagga have cultivars (we do not deal here with the alien cultivars such as ABB's and the like) which are not found with the Shambaa, then they got them from somewhere else, and the supposed 'move to the West' (along the mountain-range slopes) becomes complicated;

- if Shambaa do have more such cultivars than the Chagga, the supposed move would have 'lost underway' some of them and these would likely be AA's. IS it so?

- if no difference in composition between Shambaa and Chagga: we are safe with that move, but it may have occurred more recently…

- if the end-uses are significantly different for the same cultivars (Chagga versus Shambaa), that would indicate a time-laps in the move (in terms of centuries).

One can construct several other such '*question-frames'* for efficient study. For example:

if the AA's were semi-cultivated by people before the arrival of the Bantu, a substrate of afferent terms should subsist (which is the feeling of G.Philippson). The *question* becomes: should the cultivar names, in case the Bantu-etymology does not work, be part of that substratum? Practically: you both should try to ananlyse the names and find out if they are derived from Bantu-roots or not.

I hope you share my feeling that this is fascinating. And that no other team could perform the operation: WE are to do it, or else it will never be done (in a really productive way).

All this is at the same time very helpful in evaluating the potential of the cvs, especially the AA's.

What about the bananas in the Usambara Hills?

Documentation is scarce (mainly the dictionaries of Langheinrich, of Gleiss, and of Roehl and of Augustini, all made early 20th century).

I could not find a generic name for all the bananas in Shambaa, but the root '*-ko*' appears in "*luko (*aus *lu-ko*)" for a hand (or even bunch?) of bananas(Roehl) and this term is common with the coastal Bantu. Bondei has it too. We are at the boundary of two cultural groups of the Bantu (cfr Ehret's *Upland versus Kati*).

Of first importance is the orography: the *Bondei* and the *Shambaa* (almost same language) populate an area with *low-as well as high altitudes*, and consequently grow more categories of bananas than the Chaga.

At altitudes below 1000 msl are the groups *huti* and *m-hoye*, while the *ma-boko* grow well between 1000 and 1800 msl. This difference in habitat, plus some descriptions by Langheinrich of the groups and his names of some cultivars bring me to the following tentative table:

Group	**Description**	**Tentative Identity**	**Cultivars**
boko, sg. *m*-pl. *ma-/mi-*[29]	Mehl-banane; dunkelgrünen Früchte und Bananenstaude; rötlichem (rotbraun) Blattstiel mit dunkelgrün glänzenden Blattflachen; Blattscheiden von schwarzbrauner Fährung; Früchte sehr herb, erst an der Sonne oder dem Feuer gedörrt, dann gekocht; der Brei 'makibuku' ist schwarz, und ein sehr beliebtes Essen [30]	**EA-AAA AA**	*halahala* *kisimkila* *mfuyae* *mshezo wa mbalazi* *shumba nyelo*
huti, sg. *m-* pl. *ma-*	Obstbanane; Pflanze hellgrün; Blätter nicht so glänzend als die 'boko' und unten mattgrün (grau angehaucht); Frücht ohne nachzureifen gekocht; beliebte Nahrung auf Reisen; kommt nicht über 1400 m hoch fort.	**French Plantain (and AA?)**[31]	*bulwa*[32] *bwaza* *kibukula* *kinakina* *m-nyelo* *shumba nyelo*
hoye, sg. *m-* pl. *ma-?*	Elefantenfuβbanane; nur unter 1000 m[33];starken, hellen Stamm mit rosa Färbung an den Blattrippen; helle Blätter; kantige Früchte, weiβgrün und dann hellgelb wenn sie reifen; Fleisch lachsfarbig, schmeckt ähnlich getrockneten Äpfeln; eine groβe Unterart ist die 'mkono wa ntembo'[34]	**Horn Plantain** [35]	
tonte, sg. *m-/n-* pl. *ma-*	Süβbanane. Kleine süβe Zuckerbanane "der *huti* und *boko* Art (!?)[36]	**other AAA? AAB?**	
		Red/	*kikanda* *bokoboko*

[29] To note that the names 'boko' and 'huti' are also applied to particular tress, respectively *Antocleista orientalis* and a majestic Mahogany-tree with fruits the form of bananas.
[30] The prepared 'pasta' is called 'boko'. The dried ma-boko were so important that they served as exchange means before the adoption of money.
[31] Cfr the *m-share* with the Chaga, if these are the same as the *huti.*
[32] "Es ist ein groβe, grobo(-e?) Sorte". Looks like Giant French plantain.
[33] Which distinguish them not only from the 'boko' but surprisingly from the French Plantain too. This is another reason to suspect the presence of AA-huti's which could survive at higher altitude via stooling. Indeed, my study on Plantain on higher altitude, where they could survive at 1500 m (Kivu-area) but with much smaller fruits and a much heavier stooling than in the low-lands, brought me to the supposition that the altitude (low night temperature) has a dumping effect on apical dominance. The already more freely stooling of the diploids would make them less susceptible to this effect.
[34] This is the key to Horn plantain identification (see BS)
[35] Since several 'Unterarten' of the Plantains exist there, we will have to search for any trace of the 'False Horn' (AAA or AA): their reported (ROSSEL) absence in the whole of Eastern Africa(except W. Uganda) is a mystery.
[36] One would expect non-EA-AAA or AAB, as with the Chaga. In the Bondei dictionary of GLEISS, we find for *tonte*: reife, süβe Frücht (not 'eine Arte' for example). It is possible that the term is applied to any banana when ripe, and consequently to the AAA and AAB as well. In Chaga we find *i-kundu* for any ripe banana. To note that ABB may not yet have reached the country by the early 20th century**.**

		green Red	*nyekundu/nyeupe ya kisungu*
		Silk	*kipungusa*
		Pome	*kibungula* [37]
dizi, sg. *n-*	'eine BananenArt' (L.)		

The *Ensete ventricosum* is *tambwe* and we find here again the common name, in contrast with Chagga.[38]

Quid the Pare?

The documentation I found is qusi-nihil, except for a few quite confusing general names. It may be an indication of the mixed origin of these Bantu (*Gweno* and later the Asu) coming in the area from both the North and the South in not too remote times.

A thorough visit would probably not be very rewarding.

Other AA's?

In BS and in Simmonds' Bananas, one finds some more names for AA's for 'Lower tanzania' which would coincide with the Bondei side: *Kisukari cha kamba; Zahala; Nkokoma; Lualua.*

Some may be classical AA's, some not.

As for more AAA, the same autors mention for Lowland Tanzania: *kitarasa* (orange vascular srtands and non-staining orange-tinted sap)*; makifui* (semi-dwarf mutant of ?)*; kiseri ilalyi*

Some preliminary comparative deductions

EA-AAA are all along the mountain range. We have to sort out if an increase in cultivars exist from SE to NW, or not. Has deep implications in connection with the supposed *AA-gradient.*

We obviously have to compare:

- the *huti* of Shambaa wxith the *mshare* of Chaga;
- the *boko* of Shambaa with the *inanambo*'s of Chaga

and to sort out what is fitting aor not.

The *ilali* of Chagga is most intriguing, not?

[37] Philippson feels that the name includes a reference to 'Bengali'.
[38] The (vehicular-) Swahili name *gomba* is (was?) not used. But this term appears in several forms for parts of the banana-plant, which points to a loan-system 'Ensete->Musa'. For example: *gomba* for the sheath, *konwa* for the petiole-wings, *γome* for the bract…

Table 1 and comments.

The cultivars in Chagga-area.

A tentative classification

Note.

The sources for these names are explained in 'Comment' (Abreviations and Fonts). Since most of these sources are not reproducing the correct pronounciations in Chagga, the names in the Table are spelled in the 'western' way. Characters such as the 's', 'r' and 'b' are thus somewhat misleading. E.g. the 'b' is frequently = a soft 'bw' with symbol β.

For eventual publication, it will be necessary to carefully take note and to follow the Philippson spelling (the specialist in these Bantu-languages).

Categories		**mashami** W	**mochi** C	**wunjo** C	**mkuu** E	**useri** E	
A. **iruu** *(sensu stricto)* = Mehlbanane M							
Aa. ***ilali***- cluster	AA/AAA						
	1	ilali M	mlali R	---	mlali P	mlali P	
	2	njombo BS	mnyenyele/i R/BS	mnyanili P ?	mnyenyele P	---	
	3	mamwere M	msekaseka BS msekiseki BS	mseseki P	--	msekeseke P	
	4	imanri M	--	imanzi P	--	--	
Ab. ***inanambo***-cluster[39]	EA-AAA						
	5	inanambo M	mnanambo R	--	--	--	
	6	--	mririwu R	mririwe P	--	--	
	7	ifwanaiya M	ndisi BS	ndisi P (makindisi P ?)	--	(ndisi P)	
	8	nduuya M,BS	(ndisi R,BS)	(ndisi, makindisi ? P)	--	(ndisi P)	(or AA ?)
	9	ururabo M yonroo M	--	mrarabo P	--	--	
B. **n-share** = Röstbanane M							
	10	ilelembwa P llelembwa M	mchare R	mchare P	--	mshare P	AA
	11	nsha/nsho-noba M nshonowa BS	--	--	--	--	AA
	12	ngumadu M, BS	nyenyele R nyenyeli BS	--	--	--	AA/EA-AAA

[39] Note! One strictly 'beerbanana' exists according M. and is called *'idambolo'* with synonym *'isakania'*. Difficult to classify it here.

	12	ngumadu M, BS	nyenyele R nyenyeli BS	--	--	--	AA/EA-AAA
	13	nduuya ?M	--	makundusi ?	--	--	**see Comment 8b**
	14	mbwe M,BS mbo, mboi M	mbo R,BS	mboe P	--	--	AAB HornPl.
C. **Other** [40]							
	15	kitarasa P	kitarasa P,BS	kitarasa P	kitarasa P	kitarasa P	AAA
	16	--	kiseri ilalyi BS	makifui P,BS	--	--	AAA
	17	--	kiseri BS	--	--	--	AAA
	18	ikonosi P	mtsokosi P	mkonosi P	mkodosi P	mkonosi P	AAB Bluggoe
D. **Not alien** [41]							
	19	kimulia P	--	kiumilia P	--	--	
	20	--	--	msengwe P	msengwe P	msengwa P	
	21	kinangwa P	--	--	--	--	
	22	--	--	--	mburunya P	mburunya P	
	23	--	--	poro P	boro P	boro P	
	24	--	--	--	--	mandhoro P	
	25	--	--	--	--	mabande P	
	26	--	--	--	--	msalari P	
	27	irongo BS	--	irongwe P,BS	--	--	
	28	--	--	irufa P	--	--	
	29	--	--	--	mhoyo P	--	Plantain ?
	30	--	--	--	mshakoba P	--	Plantain ?
	31	--	--	mtoto P	--	--	--
E. **Alien** non-swahili name							
	32	ngusu BS					AB [42]
F. Alien, swahili name (such as 'kingurube', see Comments)							

[40] Genomic classification rather certain
[41] But genomic classification impossible
[42] Is the 'ney Poovan' and 'clearly a relatively recent introduction' according to Simmonds. Swahili names in the area more to the East are: the eternal 'kisukari' and 'kipukusa cha Java'.

Comments

Abbreviations and Fonts

BS= Baker and Simmonds paper; DL= De Langhe; M= Müller; P= Philippson;
R= Roehl; S= Shepherd paper
cvs= cultivars; r = the "soft" **r**
sw = swahili
W,C,E= Western versus Central and Eastern Chaga dialects according P

Regarding the Categories

A That the " Mehlbanane" have the general name for "banane" must be significant for their chronological place in the Chaga- history: were they the first edible bananas there?
Aa Lower quality; more for livestock and thus still common; alternative=beer. The growing of bananas for livestock may be unique in Africa.
Ab Common; cooking; alternative= beer;
Aa and **Ab**: The detailed comments for cultivars 1 to 9 point to secondary diversification (through somaclonal variation) starting from the cvs 1 'ilali' and 5 'inanambo' (because these are the most popular ones, they should be the "stock" for that variation). Consequently, the clusters (qualification DL) share the genomic constitution of cv 1 versus 5.

B The '*mi-share'* appear to be a mixture of AA's and Plantains probably because they all are preferentially roasted if not eaten ripe (the roasting of rather ripe Plantains is frequent in East-Africa, in sharp contrast with Central- and West-Africa). The AA's are most interesting, because never studied seriously as a group.

C and **D** There may be much more AAA's than the cvs 16 to 18 since non EA-AAA are reported further West in the Great Lakes area (e.g. *mbwazirhume, nambi, sindika*), but they form there a small minority, whereas in the Chaga region and to the East (coast and Zanzibar) they may be much more important and thus, again, not seriously studied, as a group.

E If *ngusu* is a non-swahili name then its introduction in Africa may be much older than currently supposed (as is probably the case for cv 18).

F The most popular of the alien cvs is *kingurube* = AAA Dwarf Cavendish**.** Others are *kipungara***(**P)= *kibungala*(BS)= AAB 'Pome' and *kipungusa*(BS)= AAB 'Silk'. The accuracy in the distinction between these two latter names can be questioned. So is the case with *kisukari* which name is applied to various fruit-bananas such as AAA 'Red' and 'Green Red' and AA 'Sucrier'.

Note on Ensete ventricosum

Is called '*isangaru'*. Tones were not reported and two 'Bantu'-etymologies are theoretically possible, but by no means likely:

(1) '*isanga-iru'* with low tone for the first 'a' = 'land of the banana' (from the common Bantu-term SANGA) which looks strange;

(2) '*isanga-iru'* with high 'a' tone. This 'sanga' means according M. "Vorderhals; Sitz der Appetits" in Chaga. Could be related to the 'tembwe' (for Ensete) in the Bantu of the Lakes =tummy (the banana with the -swollen- tummy). Something like (banana having good appetite)?

The problem is that Bantu does not have the 'adjective-substantive' sequence (could it be Cushitic?) and that no correct and meaningfull sense can be derived in the opposite sequence. Indeed, the Chaga use to call their region '*masanga a maru'* = 'the lands of the bananas' (in plural, without contraction), and the expression in singular for the 'wild banana' does not fit. The same name exists in Taita.

Is it an example of the non-Bantu substrate?

I thus have the suggestion that '*isangaru'* means " the banana of <u>our</u> land", pointing to the existence of *Ensete*, in contrast with bananas 'from elsewhere'.

Detail per Cultivar

1 (a) "Echte grobe Futter-und Braubanane, gewöhnlichste Mehlb., auch reife Braub. Obstb. nur in Notfall." (M) (Futter means: for livestock);

(b) = 'mnyali' in gweno (P) which sounds like the name for cv 2 in the C- and E-dialects?;

(c) ='ilyali' in BS but they consider this as synonym to cv 2 names;

(d) = AA if= 'mlali maua' (as P suggests), which is reported by S as a AA;
= AAA can not be excluded if (c) holds, because S would probably have mentioned the synonymy with
'mlali maua' in that case(! but not EA-AAA, see 7c)
Per consequence, the whole Aa cluster is either AA or AAA;

(e) comparative study with the 'muraru' (spelling BS) in Gekoyo area would be of much help to inraffle this taxonomic difficulty.

2 BS= " a common important variety. Boil, bake, beer, dry, rarely raw". This fits with the M description for cv 1, but he does not mention any of these names, which are reported by P, R, and BS! Could this mean that the name 'ilali' covers the whole Aa cluster in some dialects?

3 M= "längliche Abart von **1** (seltene...). Mehlb.,Futter und Brau "

4 M= "seltene Bananenart;...ahnlich 1 aber mit <u>rotem saft</u> (DL= case with cv 16 as S reports);...mehr Mehl-, Futter- als Obstbanane"

5 (a) M:" sehr lang und dick, fast gürkenformig; gröste Bananenart; Mehl, Obst, Rösten"

(b) = EA-AAA since cv 5= cv 6 according to R (see 6d);

6 (a)" très longue, utilisée comme 'mtshare'" (P with ref to R);

(b) = 5 according R; not mentioned in M: perhaps same reason as sub 2 for 'ilali' name?

(c)= 'utsotsoa' (spelled 'uchochoa') according BS: " bake, beer"

(d) = EA-AAA since close to cv7 (see 7a)

7 (a) M:" kurz und dick, verwandt der 5 "

(b) BS :" 'ifwanaiya' = 'ndisi' (spelled 'ndishi') ; boil, beer "

(c) = EA-AAA because S: 'ifwanaiya' belongs to the Lujugira group . This group forms, together with S's Mutika group the currently named EA-AAA and it is likely that the cvs 5 and 6 are representatives of the Mutika group (characterised by long fingers). Since both the groups are 'covered' - although sparsely- by the 'inanambo' cluster, there is no reason to assume that the 'ilali' cluster could be EA-AAA's: they are either non EA-AAA or AA. An important deduction: the EA-AAA are present in the Chagga area but do not show by far the diversity found in the Great Lakes region;

8 M suggests that two different cultivars are thus named,:

(a) M: " kurze Art der 'inanambo' " hence= EA-AAA;

(b) M: " kleinste und kürzeste Art der edlen Röstbanane nʃare " and in that case = AA (see cv 10)

(c) but BS : "'ndishi' in Kichagga= 'ifwanaya' in Kimachame : boil, beer " and M does not mention 'ndisi' for a particular cultivar; he reports in Mashame = 'ndu:ya'. It could then be that 'ndu:ya' in Mashame = 'ndiʃI' in the other dialects = 8a whereas 'makindisi' (P) = 8b

(d) consequently, it is suggested to retain the first of M's ndu:ya= ndisi = EA-AAA and to place M's 'second' 'ndu:ya' as 'makindiʃI' = a 'nʃare' cultivar = AA. If field observation confirms this assumption, the 'second' ndu:ya would best be dropped as a name;

9 M provides two different identifications but does not clearly suggest two corresponding cvs (as was the case for 8):

(a) M (on page 97 of his dictionary) : " etwas kurzer als 5, besonders beliebt am Meru" and thus EA-AAA;

(b) M (at the regular alphabetical place): "kurze, dünne Banane, zwischen Röstb. und Mehlb." and thus " between EA-AAA and AA " (in fact it cannot but be "either or"). This could turn out to be a very important cultivar because of its potential to be a AA having played a role in the genesis of the EA-AAA !

10 (a) M (for 'llelembwa') : "lang, eigentliche Röstbanane" ;

(b) The concept of 'nshare' as covering a cluster of cvs fits with M's description under that name which is focussed on the end-use (= roasting) rather than on the plant morphology: "edle,eigentliche Speisebanane, gröser als die ihr verwandte Küstenbanane". The description allows for the presence of the AAB Plantain in the cluster (bigger bananas for roasting);

(c) P (on p144) has been told that the 'nshare' are = the 'huti' of the shambaa. This hint is in harmony with M's description, and would mean that so-called coastal varieties actually did move westwards into the highlands of the continent, so that the contrast between 'Coastal cvs' and 'Highland cvs' is less pronounced than was concluded by BS and S;

(d) On the other hand, BS,S and P (who provides three slightly different dialect reflexes,including 'nkyare' in siga), report the name as applicable to one specific cv. BS: "(Kichagga) Raw, boil, bake. Common and important variety. 'Nshonowa' in Kimachame" (but see 11a);

(e) It is tempting to conclude that 'nʃare' stands for a particular variety in the Chagga dialects, except in mashame where it got the name 'llelembwa', while the first name is used in mashame for the cluster as described by M.

(f) The by BS collected 'nʃare' (spelled 'mchare' by BS) was studied by S and is definitely a AA. The plant is described as "rather tall and slender with an oblique bunch of fair size". S. notes further that the fruits are slightly seedy, which is interesting in relation with the consideration sub 9b.

11 (a) M: "etwas kürzer, härter im Fleisch, Bierbanane der Vornehmen ". This implies the existence of a distinct cv10 under the name of' llelembwa' = 'nʃare' and apparently contradicts BS (see 10d) .

(b) BS do not mention roasting as a purpose for 11=10, while they do for cv12;

(c) That the name 'nʃonowa' has not been reported for any of the non-mashame dialects is slightly alarming;

(d) Since 11 is close to 10 it would be a AA as well .

12 (a) M := 11;

(b) BS:='nlelembo' (spelling BS) and thus = 10. This difference is explainable via above notes 10d and

11a. BS: "Raw, boil, roast."

(c) Consequently = AA.

13 ? see 8d.

14 (a) M: "hellgraugrün, dreikantig, mittellang, mit gelbichen, hartem Fleisch, sehr gute Röstbanane."

(b) Is a AAB Plantain as BS state without hesitation (and M's description is completely conform). They equate ‘mbo’ (kichagga)= ‘mbwe’ (kimachame) = ‘msusu’ (swahili) = " A plantain type like ‘mkono wa tembo’ (sw) with more and smaller fingers". That description points to False Horn Plantain in contrast with Horn Plantain (= ‘mkono wa tembo’).

Both types of banana are roasted indeed in the whole of East Africa, but in most places they do not represent more than 1% of the banana fields. Their popularity despite the poor presence may be indicative of a once much more important share in the banana population.

(b) The forms ‘mbwe’, ‘mboi’ (M), ‘mboe’(P) point to the possibility of the contraction of a bi-syllabic Bantu term. If such is the case, then the term ‘m/ng-bulu’ which is applied to False Horn Plantain in a vast area of Central Africa diserves much attention in the context of how these Plantains may have 'moved' within the continent. Note also ‘ilele-mbwa’

15 (a) BS:" Raw, boil. The flesh and latex of the bulb is pinkish-orange, etc... Immature fruit has white flesh with orange-yellow latex." (see also cv4 : a genetic link ?);

(b) S = AAA distinct from the EA-AAA;

(c) Striking is that this widespread (in Chaga area that means) and peculiar cv is not mentioned neither by M nor R, while P found it systematically.

16 (a) BS: " Raw, boil, bake, beer. Plant semi-dwarf, the top of the bunch usually contained within the pseudostem, bracts persistent.";

(b) S:= AAA resembling ‘Dwarf Cavendish’;

(c) Could the synonym ‘kiseri ilali’mean " the ‘kiseri’ with’ ilali’ (i.e. longer) fingers (see cv 17) ?

17 BS: "as 16 but fingers said to be smaller and more thightly packed. Boil, raw, beer."; is thus AAA.

18 BS: " Bluggoe or Moko of the West Indies. Boil. Overwhelmingly the commonest variety on the drier foothills of Kilimanjaro near Moshi." Consequently = ABB Bluggoe.

19 P = ‘kimulia’ in siha as well.

19-31 With one exception (27) all thes cv names have been collected by one person (P). This tends to show that more than the herewith discussed 32 "indigenous" cultivars are grown in Chagga area and that further careful study would be profitable.

29 Could be a AAB French Plantain because BS report ‘muhoye’ (sw!) as French Plantain in the coastal area.

30 If this is = ‘m-sha-koßa’ then it could be a AAB Plantain as well because the radical ’ –koßa’ is frequently used for the type in East African Bantu. But the term may even cover the general concept= banana...

31 **‘**mtoto’ is said in gekoyo area for bananas convenient for children (rather AAA or AA) and the term has been noticed in a small number of Bantu languages scattered over the continent .

Bibliography

Baker, R.E.D. and Simmonds, N.W. (1951 and 1952) Bananas in East-Africa. Part 1 and Part 2. Empire Journal of Experimental Agriculture 19: 283-290 and 20: 66-76.

De Langhe, E. (1961) La taxonomie du bananier plantain en Afrique équatoriale. Journal d'Agriculture Tropicale et de Botanique Appliquée 8, pp 417-449.

De Langhe, E., Swennen R. and Vuylsteke D. (1994-5) Plantain in the early Bantu world. Azania 29-30, pp 147-160.

De Langhe, E. and De Maret, P. (1999) Tracking the banana: its significance in early agriculture. In: Chris Gosden and Jon Hather (eds) The prehistory of food: appetites for change. Routledge. London and New York.

Evers, G. (1992) Banana cultivar diversity in the area of Morogoro, Tanzania. Fruits, vol.47, n°3.

Karamura, D.A. (1999) Numerical Taxonomic studies of the East African HighlandBananas (*Musa* AAA-East-Africa) in Uganda. IPGRI 1999.

Phillipson, G. (1984) "Gens des Bananeraies" Contribution linguistique à l'histoireculturelle des Chaga du kilimanjaro. Editions Recherche sur les Civilisations. "Cahier" n° 16. Paris.

Schoenbrun, D.L. (1994-5) Social aspects of agricultural change between the Great Lakes, AD 500 to 1000. Azania 29-30 pp 270-282.

Sebasigari, K. (1987) Morphological taxonomy of *Musa* in Eastern Africa. In: Persley, G.J. & De Langhe,E.A. (eds) Banana and Plantain Breeding Strategies, pp. 172-176, ACIAR Proceedings 21, ACIAR Canberra.

Sebasigari, K. (1992) Contribution to Morphological characterization and identification of cultivars in the ICIPE's Musa germplasm collection of Ungoye Experimental

Site and in the Mika Estate. Mission Report to INIBAP.

Shepherd, K. (1957) Banana cultivars in East Africa. Tropical Agriculture 34: 277-286.

Simmonds, N.W. (1962) The Evolution of the Bananas. longmans, London.

Simmonds, N.W. (1966) Bananas. 2nd edition, Longmans, London.

Photographic illustrations

1	*Llelemwbwa*	Lax bunch. Fleshy persistent styles
2	*Llelembwa*	Deeply imbricate male bud
3	*Nshonowa*	Strongly arched fingers.
4	*Nshonowa*	Innern bract color uniform deep-orange
5	*Nshonowa*	On volcanic soil (Chagga area)
6	*Kahuti*	Trend fleshy persistent styles
7	*Shumba nyeelu*	= nshonowa with yellow-green bud
8	*Shumba nyeelu*	Innern bract color also yellow-green
9	*Mdole*	Long buch internodes. Heavily attacked by Black Sigatoka.
10	*Ilalyi*	Blunt apex of fingers. Slender bud
11	*Su'u*	Note the short fingers. The 'Mpighiti-sport ?
12	*Ilalyi*	Sheath wings scarious. Almost closed petiole canal
13	*Ilalyi*	On volcanic soil, but still less than 10 hands
14	*Ilalyi*	A waxy sport ?
15	*Ilalyi 'pinkish'*	
16	*Ilalyi 'pink'*	
17	*Mha'aha'a*	Few hands. Large fingers.
18	*Mha'aha'a*	Pink pseudostem
19	*Mlema*	Very large, cucumberlike fingers
20	*Ifwanayia*	Typical 'Nfuuka' pseudostem color
21	*Ifwanayia*	Typical 'Nfuuka' bud form and – color
22	*Ntebwa*	looks like 'Nakyetembu'
23	*Ntebwa*	Broad 'Nakyetembu'-like male bud
24	*Ibwi*	Nsakala-like fingers and bud
25	*Ibwi*	Innern bract color as with Nsakala
26	*Ntindíi 1*	'Nfuuka'-type bunch, but very short fingers and paler bud color
27	*Ntindíi 1*	Slender, 'EAHB'-type pseudostem
28	*Ntindìi 2*	AB-like fingers on a subhorizontal axis. AA-bud and-rachis
29	*Ntindíi 2*	Slender 'EAHB'-type pseudostem with erect leaves
30	*Kisangamachi*	Fingers and male bud not unlike AA'Sucrier'
31	*Kisangamachi*	
32	*Kisangamachi*	Pseudostem color as with 'Sucrier' but petiole canal narrow-to-closed
33	*Kisangamachi*	A grove with many 'Kisangamachi's
34	*Kisukari usini guse*	'Nakabululu'-type bunch, but bud is not obtuse
35	*Kisukari usini guse*	Pseudo-internodes longer than with 'Nakabululu'
36		Left : dark-green fingers of Huti (Mchare), cigar-end Right :pale-green and shiny fingers of Su'u (Ilalyi)
37	*Ensete ventricosum*	Population on forest
38	*Su'u*	Peeled finger, fermented on open air
39		Chagga lady preparing food for goats (including the male

		bud)
40		Fields inUsambara. Maïs dominates. Bananas on top of the slope, close to a village
41		Fields in Usambara. Beans with ‘here-and-there’ a banana
42		Snack at Ongoma
43		Dr.Karamura, tagging the suckers of the accession
44		Are Dr.Karamura and Dr.Mbwana convinced by what the farmer explains ?

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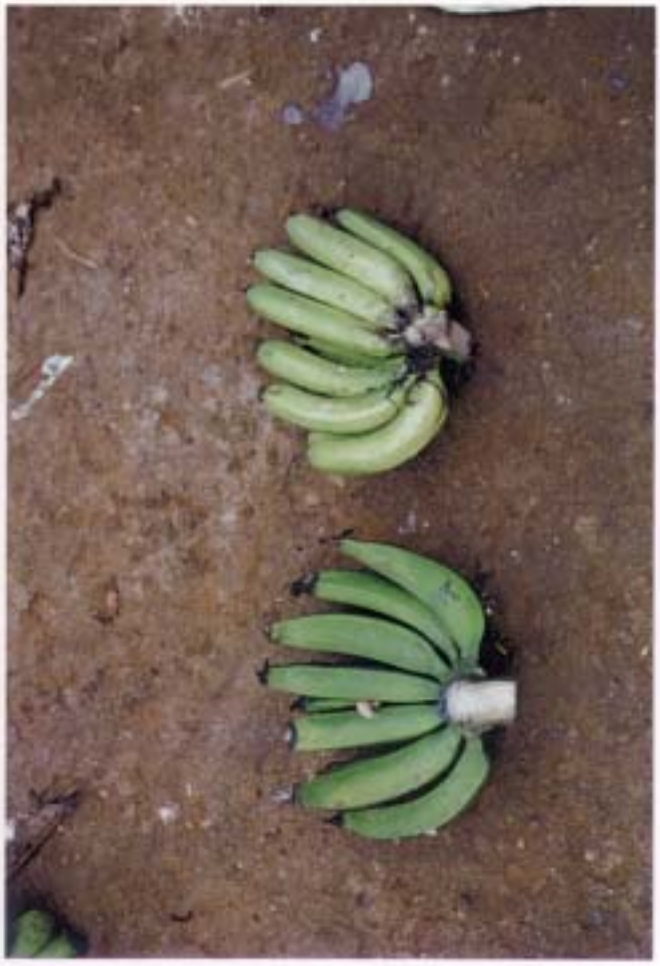

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