

Assessment of cassava diversity in Uganda using SSR markers

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Abstract:

The genetic diversity and differentiation of 272 cassava landrace accessions collected in Uganda is assessed in this study. In addition to this, 20 Tanzanian material was included from a previous study of diversity in Tanzania, 20 material from the Ghanaian germplasm bank, 20 material from Guatemala and 18 from holdings at CIAT and IITA to represent the core collection from Latin America. All together 9 groups or samples, based on country of origin, were created to study genetic diversity and differentiation within each country and among countries. Using simple sequence repeat (SSR) markers, variation in allele frequency at many unlinked loci was used to estimate the parameters of genetic diversity and differentiation, and to estimate the strengths of various forces shaping them. SSR data was analyzed by GENSURVEY (Vekemans & Lefebvre, 1997), FSTAT 2.9 (Goudet, 1995) and NTSYS-PC (Rohlf, 1993). Results affirm a genetic divergence between African and Latin American accessions. They also show a high genetic diversity and a low differentiation in the Ugandan accession. There is a substantial role played by the cassava mosaic disease (CMD) on cassava genetic constitution in respective districts.

Introduction:

Cassava (*Manihot esculenta*) is an allogamous and vegetatively propagated, neotropical crop that is also widely grown in tropical Africa and south east Asia. Sub Saharan Africa alone produces over 50% of the world's production, predominantly grown by small-scale farmers (Dixon et al, 1998). Cassava is grown mainly for its starchy roots and the leaves and forms a staple by an estimated 14 million people in Uganda (Bua, pers.comm, 2001). Cassava was introduced into Uganda after 1850 by Europeans and Arabs who were pushing into the interior from the coast of East Africa as a valuable safeguard against frequent hungry periods and famines which impeded trade and economic development along the trade routes (Langlands, 1970; Jones, 1959). Because of its excellent adaptability to erratic rainfall and low fertility soils, it became a major dietary staple, a famine reserve crop and a source of cash to many small-scale farming communities.

Cassava is probably thought to have originated in wild *Manihot esculenta* populations growing along the southern rim of the Amazon Basin in Brazil (Olsen & Schaal, 1999), many founder effects should have occurred, with the concomitant result of reduced diversity and increased genetic differentiation. For cassava, being mainly a vegetatively

propagated crop, a further reduction in genetic diversity is likely over time due to accumulation of systemic pathogens and the spread of a few, vigorous, well-adapted landraces. For instance the cassava mosaic disease (CMD) epidemic in Uganda in the late 80's and early 90's. In a survey carried out in 2000 in Mukono, Soroti and Apac districts in Uganda, the impact of the CMD epidemic on cassava diversity composition was clearly seen via the loss of previously well-known varieties.

However, the traditional farming system of slash and burn followed by 3-15 years of fallow practiced by farmers in Tanzania and the allogamous nature of cassava produces a large pool of volunteer seedlings that natural and human selection acts on to produce new varieties which maintains a high diversity (Fregene et al, 2003). In the mentioned survey in 2000, it was also observed that additional genetic variability had arisen from the use of volunteer seedlings by some farmers in Mukono district. In view of the outcrossing and highly heterogeneous nature of cassava differentiating phenotypic distinctiveness of varieties gets more complicated due to gene flow between varieties by hybridisation. Gene flow generates new polymorphism in the populations and increases effective population size thereby opposing random genetic drift, generating new gene combinations on which selection can potentially act (Balloux et al, 2002).

In Uganda identification and collection of cassava germplasm has predominantly relied on vegetative characteristics. The collections are maintained in the field in a continuous vegetative phase by cyclic pruning or periodic renewal of the entire collection every 2-4 years. In traditional farming systems, the concept of a variety can encompass very diverse genetic entities. Traditional naming and classification systems are often based on traits that are perceived subjectively in so doing it is not uncommon to find confusion between varieties or use of different names for the same cultivar (Elias et al.2001).

Determining the relationship between the basic units in a traditional classification system on the one hand and the genetic variability in the traditional farming systems in Uganda on the other hand is thus essential to conservation of genetic resources. Defining the genetic entities is crucial in breeding to identify and/or develop new cassava varieties to

be used as targets for efforts in producing high yielding varieties that meet the demands of farmers and consumers.

Using neutral genetic markers, gene genealogies can be used to assess relationships among alleles in populations. Insights into processes such as selection, fluctuation in population size, and population sub-structuring that affect the geographical and genealogical relationships among these alleles can be provided. In this study, using SSR markers, variation in allele frequency at many unlinked loci is the preferred way to assess genetic diversity and differentiation, and to estimate the strengths of various forces shaping them. In cassava, SSR markers have been used to search for duplicates in the CIAT core collection (Chavarriaga-Aguirre et al, 1999) and to analyze variation in natural populations of putative progenitors of cassava (Olsen and Schaal, 2001). A study of 67 unlinked loci, microsatellite loci from cassava landraces across three continents of Latin America, Asia and Africa have also been carried out to shed more light on the dynamics of genetic diversity and differentiation (Fregene et al, 2003). We assessed the genetic diversity and differentiation based on SSR markers of landraces from all over Uganda and a small subsection from Latin America and other African countries. The objectives of this study were to: assess the genetic diversity and differentiation of cultivars within and between different agro ecological zones in Uganda; also to determine how the Uganda cassava diversity compares with the total genetic diversity of species within Africa and the cassava collection maintained at CIAT. Genetic diversity is the key to progress in breeding and differentiation can serve as a tool to delineate heterotic pools. High levels of genetic differentiation, potentially representing heterotic pools, have been described for maize (Shull, 1952; Tomes, 1998) and robusta coffee (Leroy et al, 1993). Reliable estimates of population differentiation are crucial to understand the connectivity among populations and represent important tools to develop conservation strategies (Balloux et al, 2002) of cassava in Uganda.

Materials and methods Plant

materials:

The collection started in September through to December 2002 and covered 17 districts that lie between latitudes N02° 12¹ and S 00° 44¹, longitudes E029° 56¹ and E034° 21¹,

and altitudes of 4451ft and 2177ft above sea level. Cassava is relatively recently introduced in Uganda. It is thought to have spread from Buganda to northwest (Bunyoro) around 1870, to the east in the early 19th century and to the north even later (Langlands, 1966). Cassava generally had an extremely limited distribution in Uganda in 1900 (Langlands, 1966). There are many biotic stresses cassava in Uganda has undergone since then the major of which is ACMVD in the late 1920s and later in the 1980s. Hence the forces affecting genetic differentiation in Uganda in the last century since its introduction can be assessed here.

Three of four or five counties in each district were selected at random and mature fields (5 months and above) were selected every 7-10 km along the roads that traversed each of the counties. In each farmer's field the different varieties were identified according to their morphological characteristics as well as by the name given by the farmer. Where no single variety dominated plants of the co-dominant varieties were sampled, labelled to be planted and maintained in NAARI. A total of 221 accessions were collected. A summary of the plant materials and their source can be viewed in appendix 1.

Studies have been done to assess the genetic diversity and differentiation of cassava landraces from primary and African centers of diversity using 67 marker loci (Fregene, 2003). Based on this work 22 Nigerian landraces from both the international collection at the International Institute of Tropical Agriculture (IITA) and improved genotypes from the Institute's cassava breeding programme or the 1950s breeding efforts at the Moor Plantation Experiment Station, Ibadan, Nigeria were included. One genotype 58308, has been used extensively as donor parent for resistance to CMD in the IITA program. In addition to this, 20 Tanzanian material was included from a previous study of diversity in Tanzania, 20 material from the Ghanaian germplasm bank, 20 material from Guatemala and 18 from holdings at CIAT and IITA. 9 groups or samples, based on country of origin, were created to study genetic diversity and differentiation within each country and among countries. In all, 350 accessions were used with 272 coming from Ugandan farmers.

Simple Sequence Marker Analysis

DNA isolation was carried out from young leaf tissue harvested by CTAB method (Doyle & Doyle, 1987) at Med Biotech Laboratories, Kampala. A subset of 36 SSR markers with high polymorphism information content (PIC) was selected from 67 markers developed at CIAT (Fregene et al, 2003). In that study it was shown that the PIC does not increase appreciatively after 36 markers. The 36 markers were also chosen to represent a wide coverage of the genome. PCR was carried out using 10ng of DNA per reaction. The PCR product was denatured and electrophoresed on 6% polyacrylamide gels using BioRad sequencing apparatus. Silver staining was done as described for these SSR markers (Mba et al, 2002). Allele sizes were then determined using computer software 'quantity One' (Bio-Rad Inc.) based upon an internal gel molecular marker size standard and exported to Microsoft Excel (Microsoft Inc) for further formatting as input files for statistical analysis. A strictly diallelic model of inheritance was adhered to hence markers with three or more alleles were eliminated. Parameters of genetic diversity and differentiation were then calculated from allele data using the computer packages GENSURVEY (Vekemans & Lefebvre, 1997), FSTAT 2.9 (Goudet, 1995) and NTSYSPC (Rohlf, 1993).

Results

Data assessed on 250 accessions of cassava landraces using a total of 35 of 36 SSR loci, one eliminated for being monomorphic, was used to provide estimates for the genetic diversity and differentiation between country and within districts of Uganda.

Between countries, the landraces were grouped into 8 samples according to country of origin, Guatemala having two groups as observed in a previous diversity study (Fregene et al 2003). Within districts there were 18 groups represented. The number of alleles observed at each locus in the data set ranged from 2 to 12 alleles per locus (see fig.1) over the 35 loci. Genetic diversity parameters were calculated from SSR data within and between country samples (table 1) and within districts in Uganda (table 2) samples. Standard deviations (SD) were estimated by jackknifing over loci (200 replications). The average gene diversity, H_e , that estimates the probability that two randomly selected

alleles in a given accession are different was more than half and comparable for between Uganda districts and for between country at 0.5320 ± 0.0445 and 0.5649 ± 0.0698 respectively. On the whole the least values for average gene diversity were observed in Lira and Luweero districts while Kasese stands out with the highest value of 0.6208. This affirms earlier findings of higher varietal diversity in the western and southwestern districts of Uganda as opposed to those in the eastern districts (Otim-Nape et al, 2001). It is worth noting that these values are lowest for the districts that were worst hit by CMD. The average proportion of observed heterozygous individuals (H_o) between countries was 0.5423 ± 0.0285 while Uganda alone had 0.5530. This continues to affirm out crossing and highly heterogeneous nature of cassava. However, only 1% ($G_{st}=0.0192 \pm 0.0511$) of within district in Uganda was due to differentiation. On the other hand, 10% ($G_{st}=0.1078+0.0502$) of the overall heterozygosity ($H_i=0.6305 \pm 0.1696$) in all the country accessions could be attributed to differentiation among the samples from both Africa and Latin America.

Genetic differentiation averaged over all loci estimated by F_{st} (theta) was 0.103 ± 0.009 (jackknifing) and 0.082 ± 0.126 calculated by bootstrapping at 99% confidence interval (data not shown). This concurs with previous diversity studies in Tanzania hence confirming low differentiation between country samples as observed with G_{st} (Fregene et al, 2003). Pair wise calculations of F_{st} (theta) over all loci between pairs of country landraces and Uganda also showed there was lower differentiation between African countries compared with Latin American countries (Fregene et al, 2003), the lowest being with Ghana (0.039) and the highest being with Guatemala group one (0.2475). The dendrogram of landraces for UPGMA of pair wise F_{st} estimates had an outcome that also separates the African from Neotropical accessions with Guatemala separating in the two groups (Fig.2).

Genetic distance between all pairs of individual Uganda accessions was calculated by the 1- proportion of shared alleles (1-PSA) and presented graphically by a principle coordinate analysis (Fig. 3a). It showed that the Ugandan cassava is least related to the Neotropical. The PC1 and PC2 accounted for about 40% and 10% of the total variance respectively. The PCA for the Ugandan accessions (Fig.3b) showed clustering of the

landraces in two groups with no observable difference between districts except Nakasongola. A similar substructure has been reported for earlier studies for Ghana, Tanzania and Nigeria. This feature in the African landrace collections is yet to be explained. The representation of cassava germplasm in the two groups from most of the other districts could probably be due to extensive movement of planting material which started with the mosaic epidemic as collective efforts were made in a bid to avert the shortage of planting material (Otim-Nape 2001, Otim-Nape, 1997).

Discussion

The relatively high level of genetic diversity observed on the whole in this study is unexpected considering Uganda has reported two major cassava mosaic disease (CMD) epidemics before (Martin, 1928). The most recent CMD epidemic being in the last 10-15 years, since 1988, affected drastically the cassava varietal composition and saw a decrease in area planted to cassava at its peak between 1990-1994 (Otim-Nape et al, 2001). This finding continues to demonstrate the fact of active involvement of Ugandan farmers in continuous testing and the adaptation of new planting materials to their situations and their need to keep genetic variation. The results notably confirm the role of CMD as one of the major factors in selection force on the Uganda cassava genetic constitution with respect to districts of Uganda. It has been shown that the pattern of genetic divergence of an introduced species is usually non-random and strongly correlated to the environment (Clegg and Allard, 1972). It would be interesting to screen for the introgression of CMD resistance from the wild *Manihot glaziovii* in this cassava collection from earlier efforts in combating the disease in the 1920s and 30s (Jameson, 1964) and lately from Nigerian landraces (Fregene et al, 2003). It would also be important to find out how much overall spontaneous recombination and farmer selection is going on in Uganda.

The other fundamental finding in this study is the continued clustering of Neotropical and African landraces according to region of origin as has been found in a previous cassava diversity study (Fregene et al, 2003). The African cassava accessions also appear to be

structured in response to selection for adaptation to unique aspects of African agro ecologies (Fresco, 1986; Nweke, 1994). The underlying factors behind the small differentiation between the Uganda (East Africa) and Ghana (West Africa) accessions however remains to be understood. Uganda being an inland country may have had its founding population from both the East and west coasts of Africa. More insight into this would be obtained from an assessment of cassava diversity in the Democratic Republic of Congo to the west or the Sudan to the north of Uganda.

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Table 1: Genetic diversity within groups of cassava landraces classified according to country of origin. Standard deviations (SD) were estimated by jackknifing over loci (200 replications). H_t , H_s , D_{st} , and G_{st} ¹ are given over loci and over groups (country populations).

Population	Sample Size	No.of loci	No.of pol. Loci ^b	Percent Of pol ² . Loci	Mean no. Alleles /locus	Mean no. alleles/ pol ^b .locus	H_o ^c	H_e ^d	H_{e-p} ^e
UGANDA	198	35	33	94.3	5.2	5.4	0.5530	0.5454	0.5468
COLOMBIA	5	35	33	94.3	3.3	3.4	0.5081	0.5363	0.5963
BRASIL	3	34	33	97.1	2.8	2.8	0.5735	0.5069	0.6304
PERU	3	35	33	94.3	2.7	2.8	0.5810	0.5218	0.6619
GUATEMALA1	7	35	33	94.3	2.5	2.6	0.5290	0.3908	0.4219
GUATEMALA2	11	35	34	97.1	3.8	3.9	0.5274	0.5640	0.5906
TANZANIA	19	35	32	91.4	3.9	4.1	0.5658	0.5386	0.5536
NIGERIA	20	35	33	94.3	3.9	4.0	0.5002	0.5002	0.5131
GHANA	19	35	33	94.3	4.2	4.4	0.5429	0.5542	0.5694
Mean				94.59	3.59	3.71	0.5423	0.5176	0.5649
Std				1.70	0.86	0.89	0.0285	0.0519	0.0698

	H_t	H_s	D_{st}	G_{st}
Mean	0.6305	0.5635	0.0670	0.1078
Std	0.1696	0.1606	0.0332	0.0502
95%CI	0.5713	0.5083	0.0566	0.0916
99%CI	0.6827	0.6135	0.0767	0.1235

^c H_o = average observed heterozygosity within country ^d H_e = average expected heterozygosity within country ^e H_{e-p} = average expected heterozygosity within country corrected for small sample sizes (Nei, 1978)

¹ H_t = total heterozygosity in the entire data set; H_s = heterozygosity within country averaged over the entire data set; D_{st} = average gene diversity between populations; G_{st} = coefficient of gene differentiation.

Table 2: Genetic diversity within groups of cassava landraces classified according to district of origin in Uganda. H_t , H_s , D_{st} , and G_{st}^a are given over loci and over groups (district populations).

Population	Sample Size	No.of loci	No.of pol. Loci ^c	Percent Of pol ^c loci	Mean no. Alleles /locus	Mean no. alleles/ pol ^c .locus	H_o^d	H_e^e	H_e-p^f
APAC	6	35	30	85.7	2.8	3.1	0.5267	0.4410	0.4842
LIRA	5	35	28	80.0	2.5	2.8	0.5833	0.4011	0.4483
BUSHENYI	9	35	33	94.3	3.5	3.6	0.5838	0.5306	0.5633
KIBAALE	24	35	31	88.6	4.1	4.4	0.5697	0.5120	0.5235
HOIMA	7	35	33	94.3	3.6	3.8	0.4648	0.5470	0.5867
MPIGI	2	35	27	77.1	2.1	2.4	0.6000	0.3893	0.5476
MUBENDE	18	35	33	94.3	3.7	3.8	0.5423	0.5183	0.5335
MUKONO	23	35	31	88.6	3.7	4.0	0.5271	0.5078	0.5191
LUWEERO	4	35	29	82.9	2.4	2.7	0.4852	0.4219	0.4829
MASAKA	19	35	31	88.6	3.7	3.9	0.5716	0.5169	0.5311
KAMULI	8	35	33	94.3	3.6	3.7	0.5762	0.5084	0.5419
MASINDI	29	35	33	94.3	3.9	4.1	0.5438	0.5318	0.5412
NAKASONGOLA	5	35	30	85.7	2.6	2.9	0.5010	0.4064	0.4522
KASESE	7	35	34	97.1	3.7	3.8	0.6227	0.5740	0.6208
SIRONKO	6	35	31	88.6	3.1	3.4	0.5596	0.5082	0.5522
RAKAI	21	35	33	94.3	4.1	4.2	0.5654	0.5472	0.5606
SOROTI	2	35	27	77.1	2.1	2.4	0.5571	0.4000	0.5714
KABERAMAIDO	1	33	17	51.5	1.5	2.0	0.5152	0.2576	0.5152
mean				86.51	3.14	3.39	0.5498	0.4733	0.5320
std		10.71	0.78	0.71	0.0407	0.0801	0.0445		
	H_t	H_s	D_{st}	G_{st}					
Mean	0.5589	0.5454	0.0135	0.0192					
Std	0.1952	0.1913	0.0220	0.0511					
95% CI	0.4951	0.4840	0.0071	0.0010					
95% CI	0.6233	0.6052	0.0212	0.0355					

^a H_t = total heterozygosity in the entire data set; H_s = heterozygosity within country averaged over the entire data set; D_{st} = average gene diversity between populations; G_{st} = coefficient of gene differentiation.

^b pol. =polymorphic ^c H_o = average observed heterozygosity within country ^d H_e = average expected heterozygosity within country ^e H_{e-p} = average expected heterozygosity within country corrected for small sample sizes (Nei, 1978)

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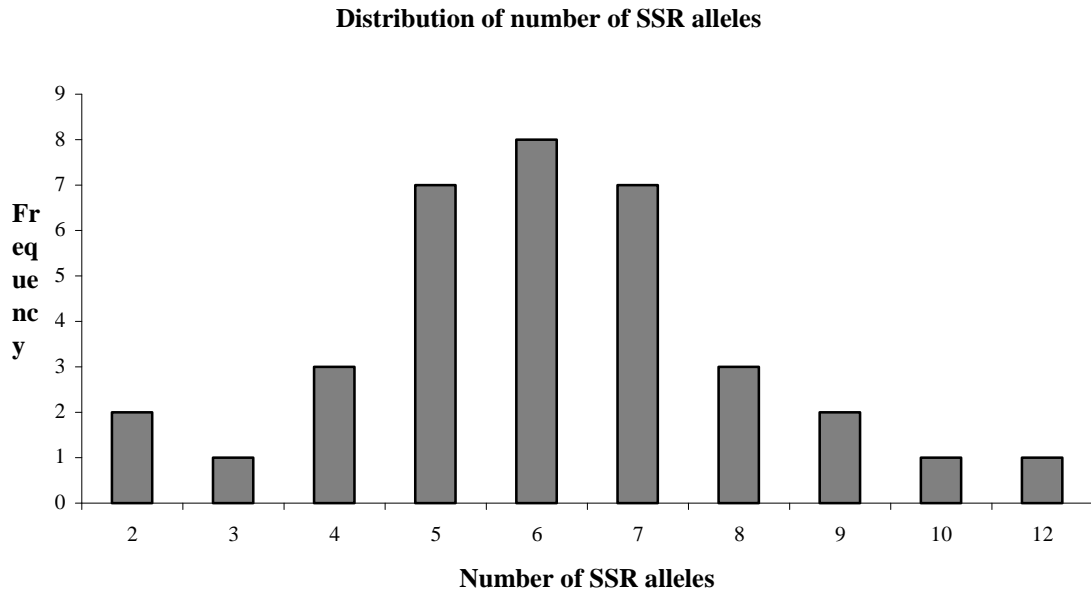


Figure 1. Number of simple sequence repeat (SSR) alleles per locus and their frequency in cassava landraces from Uganda, Nigeria, Tanzania, Ghana and selected Latin American countries.

Figure 2. Unweighted pair group method with arithmetic averaging (UPGMA) dendrogram of the pairwise fixation index (Fst) between cassava landraces, grouped by country and by source.

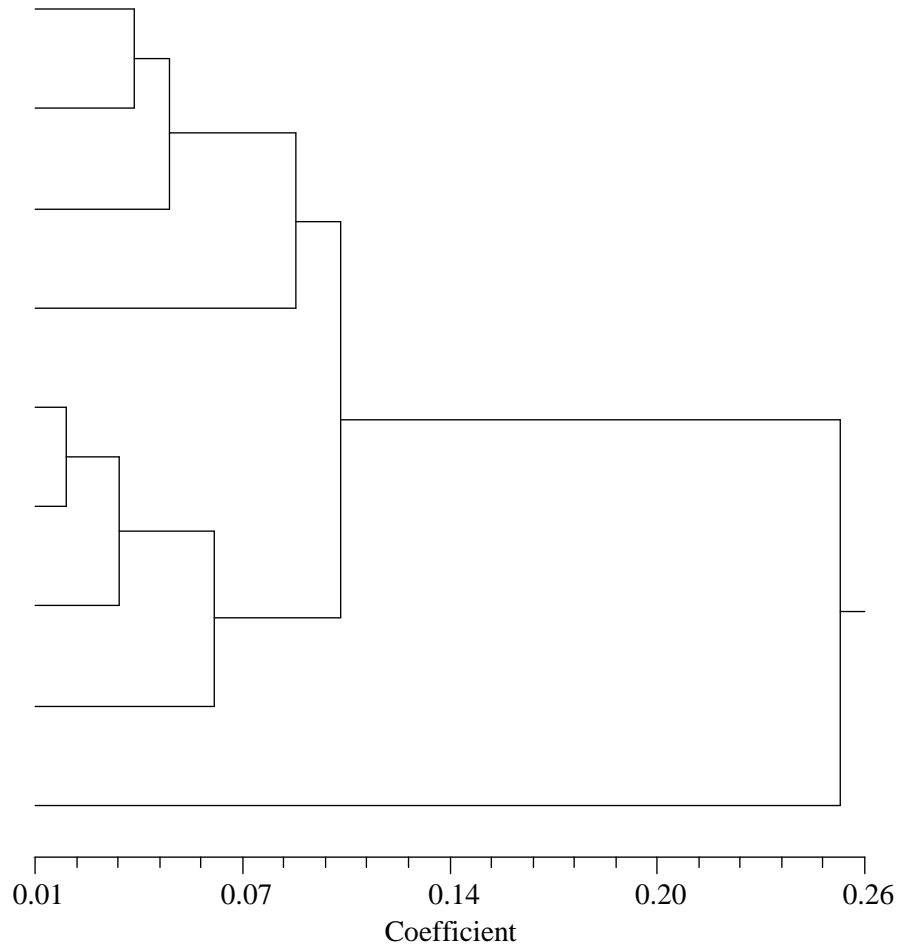
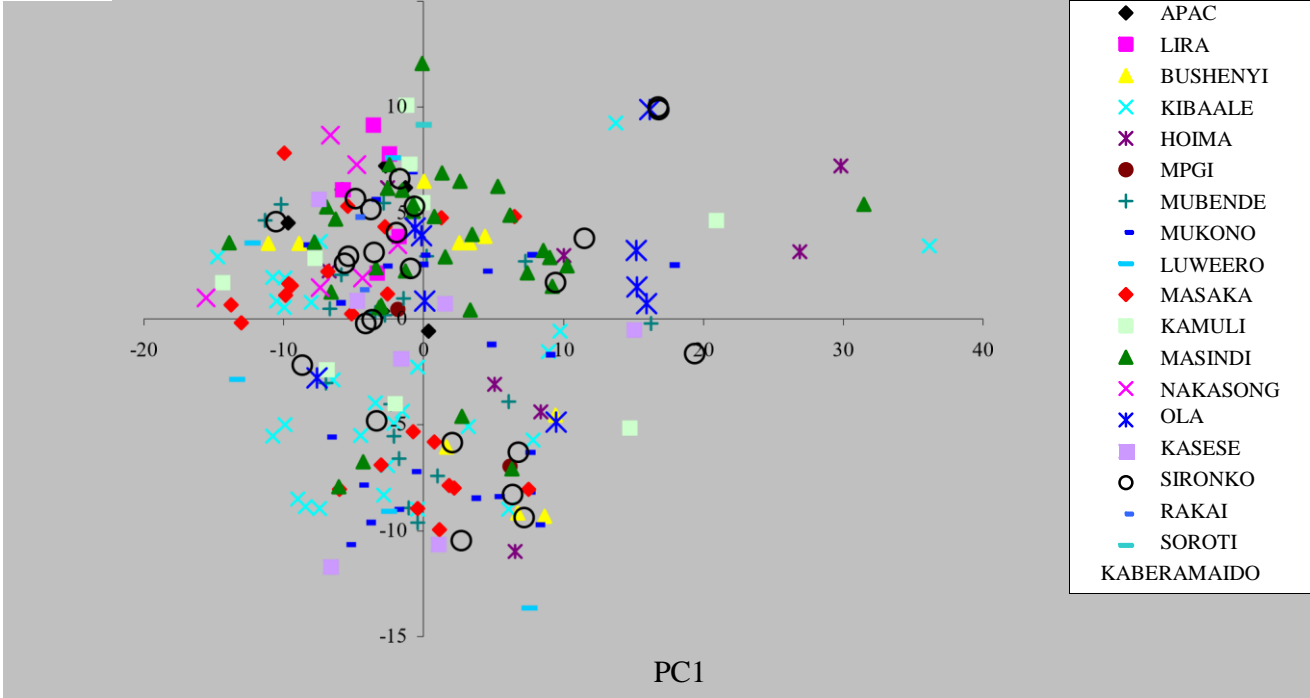


Figure 3. PCA of Genetic Distance (1-PSA) of landraces within the different districts in Uganda

PC
2



APPENDIX 1: Source data for the Uganda cassava accessions

IDENTITY	DISTRICT	COUNTY	SUBCOUNTY	PARISH	VILLAGE	NAME OF FARMER	LATD	LATM	LATH	LOND	LONM	LONH	ELEVATION(ft)	
44. Mukono	Mubende	Mityana	Busimbi	Busimbi	Kikumambogo LC1	F.5 Nanyonga Noerina	0	23	N	32	4	E	4318	
45. Kitenge	Kasese	Bukonjo	Kyondo	Kanyatsi	Kaghorwe	F.4.---; 0 1 N	29	56	E	3383				
46. kikoola	Mubende	Kassanda		Kassanda	Jjemba	F.8 Mrs. Sharifa Muwonge	0	31	N	31	47	E	4167	
47. Kabundaire I	Kasese	Bukonjo	East Lake	Katwe	Kabirizi	Rwentutu	F.1 Mr. Johnson	0	1	N	29	56	E	3383
48. Unknown 9	Rakai	Kyotera	Kasaali	Nkenge	Biwerere	F.8:Kitandwe Alamanzan	0	36	S	31	3	E	4524	
49. Unknown 30	Kibaale	Muhorro	Kagadi	kagadi	Nyamiti	F.5. Ms. Aino	0	57	N	30	47	E	4494	
50. Munyamunyu	Kasese	Bukonjo	East Lake	Katwe	Kabirizi	Rwentutu	F.1 Mr. Johnson	0	1	N	29	56	E	3383
51. Njule Rakai	Kyotera	Kasaali	Nkenge	Biwerere	F.8:Kitandwe Alamanzan		0	36	S	31	3	E	4524	
52. Rugogoma	Kibaale	Muhorro	Kagadi	Nyamiti	Nyamanga	F.2. Maria Nakabugo	0	54	N	30	45	E	4584	
53. Unknown 10	Rakai	Kyotera	Kirumba		Nabigasa LC1	F.9: Charles Nganda	0	34	S	31	29	E	4622	
54. Kayinja	Kibaale	Buyanja	Mugarama		Nyamarunda	F.6. Kiwanuka Tony	0	54	N	30	56	E	4498	
55. Kabuli	Mubende	Kassanda		Kassanda	Jjemba	F10. Alice Namono	0	31	N	31	47	E	4162	
57. Unknown 6	Rakai	Kakuuto	Kasasa		Bubango	F.6: Vincencio Ssebugwawo	0	47	S	31	30	E	4278	
58. Ngayisihira	Kasese	Bukonjo	Kyarumba		Kabirizi	Kanabusogha	F.3. Muhendo Eunia	0	7	N	29	58	E	3448
59. Unknown 44	Mubende	Kassanda		Myanzi	Myanzi	F.7 Nabukalu Margaret	0	27	N	31	55	E	3973	
60. Nvubu	Rakai	Kakuuto	Kasasa		Bubango	F.6: Vincencio Ssebugwawo	0	47	S	31	3	E	4278	
61. Unknown 13	Rakai	Kakuuto	Mukungwe		Bulayi	Mukungwe	F.1. Mrs. Ndawula	0	20	S	31	46	E	4160
62. Unknown 29	Kibaale	Muhorro	Kagadi	Nyamiti	Butumba A LC1	F.4. Mr. Irumba	0	57	N	30	47	E	4494	
63. Unknown 15	Masaka	Bukoto	East Mukungwe		Kalagala	F.6. Yiga Misaala	0	20	S	31	52	E	4029	
64. Nyakabibi	Kasese	Bukonjo	Munkunyu		Kitsutsu	Kitsutsu II	F.5. Eric Mutsangye	0	3	N	29	50	E	4416
65. Kabundaire II	Kasese	Bukonjo	Kyarumba		Kabirizi	Kanabusogha	F.3. Muhendo Eunia	0	7	N	29	58	E	3448
66. Mafumu	Masaka	Bokoto	East Mukungwe		Katwadde	Luvule	F.3.Ms. Kizza Taatu	0	7	S	31	50	E	4013
67. Mpologoma I	Rakai	Kyotera	Kirumba		Nabigasa LC1	F.9: Charles Nganda	0	34	S	31	29	E	4622	
69. Unknown 4	Rakai	Kakuuto	Kifamba	Kabala		F.4: Hosea Sentalo	0	48	S	31	25	E	4308	
70. Muva Ssesse	Masaka	Bukoto	East Mukungwe		Bulayi	Mukungwe	F2. Ms. Josephine Nalwoga	0	20	S	31	46	E	4160
71. Bukumbula	Masaka	Bukoto	East Mukungwe		Katwadde	Kayugi	F.5. Ms. Nalubowa	0	19	S	31	52	E	4023
72. Unknown 46	Mubende	Kassanda		Myanzi	Myanzi	F.7 Nabukalu Margaret	0	27	N	31	55	E	3973	
73. Kiboga	Kibaale	Muhorro	Kagadi	Nyamiti	Muhorro	F.3. Mary Nalubega	0	55	N	30	46	E	4498	
74. Unknown 8	Rakai	Kyotera	Kasaali	Nkenge	Biwerere	F.8:Kitandwe Alamanzan	0	36	S	31	30	E	4524	

75.	New Bukalasa	Kibaale	Muhorro	Kagadi	Nyamiti	Nyamanga	F1. Josephat Rubani	0	54	N	30	45	E	4583	
76.	Unknown 11	Rakai	Kyotera	Kirumba		Nabigasa LC1	F.9: Charles Nganda	0	34	S	31	29	E	4622	
77.	Kanyali	Kibaale	Kagadi	Kagadi	Kiryani		F.12. Hamisi Bikwasiroha	0	5	N	30	50	E	4031	
78.	Unknown 12	Rakai	Kyotera	Kirumba	Kito		F10. Mukyala Rose	0	30	S	31	30	E	4662	
79.	Manyi ga balimi	Rakai	Kakuuto	Kifamba	Nyanga		F.5: Masitula Nanyuma	0	47	S	31	27	E	4304	
80.	Unknown 28	Kasese	Bukonjo	Munkunyu	Kitsutsu	Kitsutsu II	F.5. Eric Mutsangye	0	3	N	29	50	E	4416	
81.	Nyakeera	Kibaale	Muhorro	Kagadi	Nyamiti	Nyabubaare	F.5. Ms. Aino	0	57	N	30	47	E	4494	
82.	Nyakunyaku I	Kibaale	Muhorro	Kagadi	Nyamiti	Nyamanga	F.2. Maria Nakabugo	0	54	N	30	45	E	4583	
83.	Sembati	Kasese	Bukonjo	East Lake	Katwe	Kabirizi	Rwentutu	F.1 Mr. Johnson	0	1	N	29	56	E	3383
84.	Tanzania	Kibaale	Muhorro	Kagadi	Nyamiti	Muhorro	F.3. Mary Nalubega	0	55	N	30	46	E	4498	
85.	Unknown 14	Masaka	Bukoto	East Mukungwe		Bulayi	F.1.Mrs.Ndawula	0	20	S	31	46	E	4160	
86.	Matooke	Kibaale	Buyanja	Mugarama		Nyamarunda	Kateete	F.6. Kiwanuka Tony	0	54	N	30	56	E	4498
87.	Mikidadi Buteeraba	Rakai	Kakuuto	Kifamba		Nyanga	F.5: Masitula Nanyuma	0	47	S	31	27	E	4304	
88.	Gwaranda	Kibaale	Buyanja	Mugarama		Nyamarunda	Kateete	F.6. Kiwanuka Tony	0	54	N	30	56	E	4498
89.	Kidimo	Kibaale	Muhorro	Kagadi	Nyamiti	Nyamanga	F.2. Maria Nakabugo	0	54	N	30	45	E	4583	
90.	Bukalasa omukadde	Kibaale	Muhorro	Kagadi	Nyamiti	Nyamanga	F1. Josephat Rubani	0	54	N	30	45	E	4583	
91.	Kakiru	Kasese	Bukonjo	Munkunyu	Kitsutsu	Kitsutsu II	F.5. Eric Mutsangye	0	3	N	29	50	E	4416	
92.	Unknown 31	Kibaale	Buyanja	Mugarama		Nyamarunda	Kateete	F.6. Kiwanuka Tony	0	54	N	30	56	E	4498
93.	Unknown 48	Mubende	Kassanda		Kassanda	Jjemba	F.8 Mrs. Sharifa Muwonge	0	31	N	31	47	E	4167	
54.	Kayinja	Kibaale	Buyanja	Mugarama		Nyamarunda	Kateete	F.6. Kiwanuka Tony	0	54	N	30	56	E	4498
95.	Kirabba	Kibaale	Muhorro	Kagadi	Nyamiti	Nyamanga	F.2. Maria Nakabugo	0	54	N	30	45	E	4583	
96.	Unknown 109	Mukono	Kyampisi	Bulijjo		Kitanda	F.1 Stephen Ssebowa	0	29	N	32	46	E	3886	
97.	forest Kyampisi	Mukono	Kyampisi	Bulijjo		Kitanda	F.1 Stephen Ssebowa	0	29	N	32	46	E	3886	
98.	Unknown 91	Sironko	Budadiri	Bumasifa	Bulwala	Lulangasa	F.6 Francis Mafabi	1	10	N	34	22	E	4451	
99.	Unknown 115	Mukono	Kyampisi	Bulijjo		Kitanda	F.1 Stephen Ssebowa	0	29	N	32	46	E	3886	
100.	Kabwa	Mukono	Kyaggwe	Nakisunga	Kyabalogo	Nakisunga	F.6 Rachel Nabawanuka	0	17	N	32	48	E	3955	
101.	Unknown120	Mukono	Kyampisi	Bulijjo		Kitanda	F.5 Hajji Swaliki	0	29	N	32	45	E	3930	
102.	Unknown 97	Lira	Kyoga	Muntu	Amolartar	Orimai	F.2 Jonas Epia	1	38	N	32	51	E	3534	
103.	Njule omweru	Mukono	Kyaggwe	Ntenjeru	Ntanzi	Ntanzi	F.7 Walusimbi George	0	13	N	32	49	E	4050	
104.	Unknown 114	Mukono	Kyampisi	Bulijjo		Kitanda	F.3 Nsubuga	0	29	N	32	45	E	3947	
105.	Opio- opio	Apac	Kwania	Abongomola	Abany	Awei	F.3 Richard Atine	2	0	N	32	47	E	3538	
106.	Nyasenge	Hoima	Kigoroby		Kapapi	Nyanseko	siiba	F.24. Oliver B.Nyansonga					E		
107.	Unknown 104	Masindi	Kibanda	Kiryandongo	Kikuube	Kalangala	F.4. Oloya Esther	1	53	N	32	5	E	3570	
108.	Unknown 63	Hoima	Kitoba	Bugahya	Kiragura	Dwoli	F.22 Yoramu Byeitima	1	31	N	31	21	E	3817	
109.	Alwaa Kaberamaido	Kalaki	Kalaki	Kalobo			F.1 Rev. Ewenu	1	51	N	33	24	E	3498	
110.	Kyankwanzi	Apac	Kwania	Abongomola	Abany	Awei	F.1 Abili James	2	0	N	32	47	E	3538	
111.	Nyaraboke short	Apac	Maruzi	Ibujje	Aganga	Aganga	F.5 Otim Geoffrey	1	46	N	32	13	E	3530	
112.	Unknown 99	Masindi	Kibanda	Kiryandongo	Kikuube		F.2. Edison								
113.	Kisembo	1	52	N	32	3	E	3626							
113.	Nyadhiang	Apac	Maruzi	Ibujje	Aganga	Aganga	F.5 Otim Geoffrey	1	46	N	32	13	E	3530	
114.	Njule	Mukono	Kyampisi	Bulijjo		Kitanda	F.2 Mwasanje								

Kizito 0 29 N 32 45 E 3929 115. Unknown 118 Mukono Kyampisi Bulijjo Kitanda F.4 Kijambu Ponsiano 0 29 N 32 45 E 3958 116. Elogilog Soroti Kasilo Bugondo Kamodo Otimo F.1 Aswaro Lucy 1 33 N 33 23 E 3595 117. Unknown 121 Mukono Kyampisi Bulijjo Kitanda F.5 Hajji Swalik 0 29 N 32 45 E 3930 118. Unknown 87 Kamuli Budioppe Ndolwa Wesunire Kalwaala F.3 Balye Namagaya 1 14 N 33 3 E 3517 119. Kibira Kamuli Bugabula Balawoli Balawoli Namayira F.2. A. V. Kubirima 1 2 N 33 5 E 3737 120. Egabu Soroti Kasilo Bugondo Kamodo Otimo F.1 Aswaro Lucy 1 33 N 33 23 E 3595 121. Nganyi Lira Kyoga Muntu Amolartar Orimai F.2 Jonas Epia 1 39 N 32 51 E 3534

122. Naiboke Mukono Kyampisi Bulijjo Kitanda F.3 Nsubuga 0 29 N 32 45 E 3947

123. Okonyo la dak Masindi Kibanda Kiryandongo Kikuube Kalangala F.4. Oloya Esther 1 53 N 32 5 E 3570 124. Socadido Soroti Gweri Dokolo Abelet F.2 Ecom Joseph 1 42 N 33 43 E 3578 125. Unknown 88 Kamuli Budioppe Ndolwa Wesunire Kalwaala F.3 Balye Namagaya 1 14 N 33 3 E 3517 126. Icil icil Lira Dokolo Kangai Akurolango Ilong F.3 Ekwang Jovan 1 46 N 33 5 E 3526 127. Unknown 24 Bushenyi West Igara Kyamuhunga Gongo F.5. Eva Kyokusimiire 0 25 S 30 7 E 3845 128. kayumba Mpigi Mawokota Muduuma Muduuma Buyala F.1 Kalanzi George 0 19 N 32 24 E 3901 129. Tima-tima Masindi Kibanda Kiryandongo Kikuube F.2. Edison Kisembo 1 52 N 32 3 E 3626 130. Njule Mukono Kyaggwe Nakisunga Kyabalogo Nakisunga F.6 Rachel Nabawanuka 0 17 N 32 48 E 3955 131. Unknown 127 Mukono Kyaggwe Ntenjeru Ntanzi Ntanzi F.7 Walusimbi George 0 13 N 32 49 E 4053 132. Nyakabiriri Masindi Biiso biiso Busingiro F.27 Dolica Kanyinga E

133. Matooke Mukono Kyaggwe Ntenjeru Ntanzi Ntanzi F.7 Walusimbi George 0 13 N 32 49 E 4045 134. Unknown 65 Hoima Kitoba Bugahya Kiragura Dwoli F.22 Yoramu Byeitima 1 31 N 31 21 E 3817 135. Unknown 60 Kibaale Buhaguzi Kabwoya Gwanjula Karama F.16. Dr. Banana Jackson E

136. Unknown 113 Mukono Kyampisi Bulijjo Kitanda F.2 Mwasanje Kizito 0 29 N 32 45 E 3929 137. Unknown 85 Kamuli Bugabula Balawoli Balawoli Namayira F.2. A. V. Kubirima 1 2 N 33 5 E 3737 138. Unknown 103 Masindi Kibanda Kiryandongo Kikuube KikuubePri. Sch. F.3. Alimundu Nehemia 1 53 N 32 4 E 3584

139. Kakoote Sironko Budadiri Buhugu Bumatofu Biwa F.3 William Kisolo 1 12 N 34 19 E 3966 106. Nyasenge Hoima Kigoroby Kapapi Nyanseko siiba F.24. Oliver B.Nyansonga E

141. Mukalasa Sironko Budadiri Busulani Bugimunye Namwege F.5 Nape Ismail 1 9 N 34 21 E 4230 142. Unknown 90 Sironko Budadiri Busulani Bugimunye Namwege F.4. Deo Makweta 1 9 N 34 21 E 4225 144. Unknown 107 Mukono Kyampisi Bulijjo Kitanda F.1 Stephen Ssebowa 0 29 N 32 45 E 3902

145. Unknown 116 Mukono Kyampisi Bulijjo Kitanda F.1 Stephen Ssebowa 0 29 N 32 45 E 3902 146. Fumbachai Kamuli Budiopie Buyende Wesunire kinambugo F.5. Kinambugo 1 13 N 33 8 E 3582 147. Nakyanzi omumyufu Mukono Kyaggwe Ntenjeru Ntanz Ntanz F.7 Walusimbi George 0 13 N 32 49 E 4053 148. Unknown 125 Mukono Kyaggwe Ntenjeru Ntanz Ntanz F.7 Walusimbi George 0 13 N 32 49 E 4050 149. Unknown 5 Rakai Kakuuto Kifamba Kabala Kabala F.4: Hosea Sentalo 0 48 S 31 25 E 4308 150. Unknown 2 Rakai Kooki Byakabanda Katerero A F.3: Bwogi Eriabu 0 45 S 31 25 E 4327

151. Unknown 32 Masaka Mawokota Muduuma Buyala F.1 Kalanzi George 0 19 S 32 24 E 3901 152. Nyarowic Masindi Buliisa Buliisa Ngwedo Kisomero F.26 Kisomero 2 12 N 31 28 E 2177 153. Unknown 100 Masindi Kibanda Kiryandongo Kikuube F.2. Edison Kisembo 1 51 N 32 3 E 3626 154. Unknown 106 Masindi Kibanda Kiryandongo Kikuube Kalangala F.5. Kabasinguzi Beatrice 1 52 N 32 4 E 3571 156. Unknown 98 Masindi Kibanda Masindi port Kitukuza Masindi port F.1 Mzee Ogutu 1 41 N 32 5 E 3460 157. Unknown 96 Lira Kyoga Muntu Amolartar Orimai F.2 Jonas Epia 1 37 N 32 51 E 3534 158. Teraka Mukono Kyampisi Bulijjo Kitanda F.2 Mwasanje Kizito 0 29 N 32 45 E 3929 159. Nyamaga Masindi Kibanda Kiryandongo Kikuube Pri Sch. F.3. Alimundu Nehemia 1 52 N 32 4 E 3584 160. Kenya-kenya Lira Kwania Abongomola Abany Awei F.4 Ocen Joel 2 0 N 32 46 E 3490 161. Unknown 89 Sironko Budadiri Butandiga Nandago Saralila F.2 Patrick Nfuya 1 14 N 34 17 E 3787 162. Unknown 92 Sironko Budadiri Bumasisa Bulwala Lolobi F.7 Michael Ojele 1 10 N 34 21 E 4391 163. Nyaraboke tall Masindi Kibanda Kiryandongo Kikuube Kalangala F.4. Oloya Esther 1 52 N 32 4 E 3570 164. Unknown 84 Kamuli Bugabula Balawoli Balawoli Namayira F.2. A. V. Kubirima 1 1 N 33 5 E 3737 165. Unknown 108 Mukono Kyampisi Bulijjo Kitanda F.1 Stephen Ssebowa 0 29 N 32 45 E 3902 166. Sezalanda Masindi Kibanda Kiryandongo Kikuube Kalangala F.5. Kabasinguzi Beatrice 1 52 N 32 4 E 3571 167. Unknown 112 Mukono Kyampisi Bulijjo Kitanda F.2 Mwasanje Kizito 0 29 N 32 45 E 3929

168. Unknown 42 Mubende Kassanda Myanzi Myanzi F.7 Nabukalu Margaret 0 26 N 31 54 E 3973 169. Unknown 86 Kamuli Bugabula Balawoli Balawoli Namayira F.2. A. V. Kubirima 1 1 N 33 5 E 3737 170. Mpologoma II Mukono Kyampisi Bulijjo Kitanda F.1 Stephen Ssebowa 0 29 N 32 45 E 3902 171. Unknown 94 Soroti Kasilo Bugondo Kamodo Otimo F.1 Aswaro Lucy 1 33 33 22 3595 172. nyakunyaku Masindi Budongo Kabango Nyamagita III F.29. Desire Yonah 1 38 32 31 3630 173. Unknown 101 Masindi Kibanda Kiryandongo Kikuube Pri Sch. F.3. Alimundu Nehemia 1 52 N 32 4 E 3584 85. Unknown 14 Masaka Bukoto East Mukungwe Bulayi F.1.Mrs.Ndawula 0 20 S 31 46 E 4160 175. Unknown 71 Masindi Ihungu Karujubu Nyamagisa Karujubu LC1 F30. Mariko Kaahwa 1 40 N 31 39 E 3611 176. Unknown 68 Masindi Biiso Biiso Busingiro F.27 Dolica Kanyinga 1 43 N 31 27 E 3586 177. Unknown 39 Mubende Mityana Busimbi Busimbi Kikumambogo LC1 F.5 Nanyonga Noerina 0 23 N 32 4 E 4318 178. Kinyara Masindi Kigoroby Kigoroby Kitana Nyabago F.23 Miriosi Kaheru 1 36 N 31 18 E 3585 179. Bukalasa 2 Masindi Budongo Kabango Nyamagita III F.29. Desire Yonah 1 38 N 31 31 E 3630 180. Sukaali Mubende Kassanda Kassanda Jjemba F9. Winnie G.Nalubega 0 31 N 31 47 E 4162 181. Unknown 73 Masindi Ihungu Karujubu Nyamagisa Karujubu LC1 F30. Mariko Kaahwa 1 40 N 31 39 E 3611 182. Unknown 3 Rakai Kakuuto Kifamba Kabala F.4: Hosea Sentalo 0 48 S 31 25 E 4308 183. Nabubaale Rakai Kooki Byakabanda Kasiika Kitaasa F.1:Agnes Nalumansi 0 44 S 31 22 E 4353 184. Bukalasa Rakai Kakuuto Kifamba Kabala F.4 Hosea Sentalo 0 48 S 31 25 E 4308 185. Kagadi 2 Masaka Mawokota Muduuma Buyala F.2 Disan Iga 0 19 S 32 23 E 3908

186. Unknown 102 Masindi Kibanda Kiryandongo Kikuube Kikuube Pri Sch. F.3. Alimundu Nehemia 1 52 N 32 4 E 3584 187. Njule omumyufu Mukono Kyaggwe Ntenjeru Ntanz Ntanz F.7 Walusimbi George 0 12 N 32 48 E 4053 188. Karangwa Masindi Biiso Biiso Busingiro F.27 Dolica Kanyinga 1 43 N 31 27 E 3586 189. Unknown 64 Hoima Kitoba Bugahya Kiragura Dwoli F.22 Yoramu Byeitima 1 30 N 31 21 E 3817 190. Unknown 110 Mukono Kyampisi Bulijjo Kitanda F.1 Stephen Ssebowa 0 29 N 32 45 E 3902 191. Unknown 111 Mukono Kyampisi Bulijjo Kitanda F.2 Mwasanje Kizito 0 29 N 32 45 E 3929 192. Abolotong Lira Kyoga Muntu Muntu Abarler F.1. Ekwang Peter 1 38 N 32 53 E 3547 193. Nakyanzi Mukono Kyampisi Bulijjo Kitanda F.1 Stephen Ssebowa 0 29 N 32 45 E 3902 194. Karangwa Kibaale Buhaguzi Kabwoya Gwanjula Karama F.21. Dr. Banana Jackson E

N E
N E

195. Ngalo za Muteesa Rakai Kakuuto Kifamba Kabala F.4: Hosea Sentalo 0 48 S 31 25 E 4308 196. Unknown 38 Masaka Mawokota Muduuma Bulamu F.4 Namazzi Jesca 0 21 S 32 17 E 4029 197. Tweyambule Masaka Bukoto west Kito Lwengo Luti F.8. Richard Mujumbwa 0 32 S 31 38 E 4481 198. Buziina Masaka Bukoto west Kito Lwengo Luti F.8. Richard Mujumbwa 0 32 S 31 38 E 4481 199. Unknown 17 Masaka Bukoto west Kito Lwengo Luti F.8. Richard Mujumbwa 0 32 S 31 38 E 4481 200. Kwatamumpale Rakai Kakuuto Kifamba Kabala F.4: Hosea Sentalo 0 48 S 31 25 E 4308 201. Bukalasa 4 Rakai Kakuuto Kifamba Kabala F.4: Hosea Sentalo 0 48 S 31 25 E 4308 202. Kirimumpale Masindi Buliisa Buliisa Ngwedo Kisomero F.26 Kisomero 2 12 N 31 28 E 2177 203. Unknown 69 Masindi Biiso Biiso Busingiro F.27 Dolica Kanyinga 1 43 N 31 27 E 3586

204. Unknown 67 Masindi Buliisa Buliisa Ngwedo Kisomero F.26 Kisomero E

205. Nyarukwii Masindi Buliisa Buliisa Kigwera Kirama F.25 Santino 2 11 N 31 25 2177 206. Busuulwa Rakai Kooki Byakabanda Kasiika Kitaasa F.1: Agnes Nalumansi 0 44 S 31 22 E 4353

207. Unknown 76 Nakasongola Nakitoma Kigweri Kimatwe F.1 Sekiganda Alex 1 29 N 32 7 E 3520 208. Unknown 128 Mukono Kyaggwe Ntenjeru Ntanzi Ntanzi F.7 Walusimbi George 0 12 N 32 48 E 4053 209. Kitooke Kibaale Buyaga Mabaare Nyansoro F.17. Katarbarwa Anatoli 1 3 N 30 30 E 3952 210. Unknown 27 Bushenyi Bunyaruguru Kicwamba Kicwamba H/Q F.6. Kicwamba s/county HQ 0 14 S 30 5 E 2893 211. Kanabuto Kibaale Buyaga Rugashari Burora Nyamigasa F.19 Habyarema Diyadoni 1 5 N 30 51 E 3760 212. Unknown 52 Kibaale Kagadi Kagadi Kiryani F.12. Hamisi Bikwasiroha 0 57 N 30 49 E 4031 213. Tanzania Mukono Kyaggwe Ntenjeru Ntanzi Ntanzi F.7 Walusimbi George 0 12 N 32 48 E 4053 214. Yosam Hoima Kigorobya Kigorobya TC Kitana Nyabago F.23 Miriosi Kaheru 1 36 N 31 18 E 3585 215. Kabwa Mukono Kyaggwe Nakisunga Kyabalogo Nakisunga F.6 Rachel Nabawanuka 0 16 N 32 47 E 3955 216. Unknown 19 Masaka Bukoto west Kito Lwengo Luti F.8. Richard Mujumbwa 0 32 S 31 38 E 4481

217. Kasimwenge Masindi Kigorobya Kapapi Nyanseko siiba F.24. Oliver B. Nyansonga E

218. Bukalasa 5 Kibaale Buyaga Mabaare Kitemuzi Kitemuzi F.15. Kairu Vincent E

219. Bao Mukono Kyaggwe Ntenjeru Ntanzi Ntanzi F.7 Walusimbi George 0 12 N 32 48 E 4050 220. Kikomeko Kibaale Buyanja Mugarama Nyamarunda Kateete F.6. Kiwanuka Tony 0 54 N 30 56 E 4498 221. Kwatamumpale Masaka Mawokota Muduuma Sabagabo Namabale F.3 Elizabeth Zawedde 0 20 S 32 21 E 3958 222. Bukalasa 6 Bushenyi West Igara Nyabubaare Kigoma Kyomya F.2. Atukunda Jovinta 0 31 S 30 6 E 4157 223. Nyaruvoya Masindi Buliisa Buliisa Kigwera Kirama F.25 Santino; 2 11 N 31 25 E 2177 224. Njule Masaka Mawokota Muduuma Bulamu F.4 Namazzi Jesca 0 21 S 32 17 E 4029 225. Unknown 18 Masaka Bukoto west Kito Lwengo Luti F.8. Richard Mujumbwa 0 32 S 31 38 E 4482 226. Unknown 49 Mubende Mityana Kassanda Kyabadde F.11. Mr. Odaka Mulima 0 29 N 31 44 E 4093 227. Rugogoma Kibaale Kibaale Mabaare Nyansoro F.17. Katarbarwa Anatoli 1 3 N 30 30 E 3952 228. Unknown 47 Mubende Kassanda Myanzi Myanzi F.7 Nabukalu Margaret 0 26 N 31 54 E 3973 229. Unknown 82 Kamuli Buzaaya Nawanyago Bugobi Bupadhengo F.1 Janet Nabirye 0 43 N 33 9 E 3599 230. Obuku-obuku Apac Kwanja Abongomola Abany Awei F.3 Richard Atine 2 0 N 32 46 E 3537 231. Mpologoma Nakasongola Nakitoma Bujabe Bugaramura F.2. Yorokamu Byarufu 1 31 N 32 0 E 3508 232. Mutamisi Sironko Budadiri Butandiga Nandago Saralila F.1 Nabuluganyo 1 14 N 34 17 E 3805 233. Kyapadilaya Kibaale Buyaga Kyanaisoke Mugalike F.14 Mwesige Pascavia 1 0 N 30 52 E 3962 234. Unknown 62 Hoima Kitoba Bugahya Kiragura Dwoli F.22 Yoramu Byeitima 1 30 N 31 21 E 3817 235. kanyegamire Kibaale Buyaga Rugashari Rugashari Kibuga F.19. Charity Sofia 1 5 30 49 3772

236. Bukalasa Mubende Mityana Mityana TC F.6 Okot Betty 23 32 4 4304

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237. Kikoola Mubende Kassanda Jjemba F.8 Mrs. Sharifa Muwonge 31 N 31 47 4167 238. Unknown 56 Kibaale Buyaga Mabaare Nyansoro F11. Paulo Bakeisa 1 3 N 30 30 3952 239. Unknown 61 Hoima Kitoba Bugahya Kiragura Dwoli F.22 Yoram Byeitima 1 30 N 31 21 E 3817 240. Nyakaswiga Kibaale Buyanja Mugarama Nyamarunda Kateete F.6. Kiwanuka Tony 0 54 N 30 56 E 4498 241. Unknown 58 Kibaale Buyaga Mabaare Nyansoro F17. Katarwa Anatoli 1 3 N 30 30 E 3952 242. Kibatikire Kibaale Kagadi Kagadi Kiryani F.12. Hamisi Bikwasiroha 0 57 N 30 49 E 4031 243. Unknown 79 Rakai Kakooge Kyabutaik Kakooge Kyabutaik F.1 Wanyana Florence 1 5 S 32 29 E 3524 244. Unknown 1 Rakai Kooki Byakabanda Katerero B F.2: Mukyala Namugerwa 0 45 S 31 25 E 4328 245. Unknown 55 Kibaale Buyaga Kyanaisoke Mugalike health Centre F.14 Mwesige Pascavia 1 0 N 30 52 E 3962 246. Kanyali Kibaale Muhorro Kagadi Nyamiti Nyamanga F1. Josephat Rubani 0 54 N 30 45 E 4584 247. Njule Masaka Mawokota Muduuma Bulamu F.4 Namazzi Jesca 0 21 S 32 17 E 4029 248. Kwatamumpale Masaka mawokota Muduuma Kisoga Namabale F.3 Elizabeth Zawedde 0 20 S 32 21 E 3958 249. Yaadi Luweero Bamunanika Kalagala Vumba Vumba F.5. Mr. Galiwango 0 36 N 32 41 E 3996 250. Unknown 51 Kibaale Kagadi Kagadi Kiryani F.12. Hamisi Bikwasirohae 0 57 N 30 49 E 4031 251. Unknown 57 Kibaale Buyaga Mabaare Nyansoro F16. Paulo Bakeisa 1 3 N 30 30 E 3952 252. Unknown 43 Mubende Kassanda Myanzi Myanzi F.7 Nabukalu Margaret 0 26 N 31 54 E 3973 253. Bukalasa bitter Bushenyi Igara west Nyabubaare Kigoma Kyomya F.2. Atukunda Jovinta 0 31 S 30 6 E 4157 254. Mpologoma Mubende Kassanda Kassanda Jjemba F10. Alice Namono 0 31 N 31 47 E 4162 255. Unknown 25 Bushenyi Igara west Kyamuhunga Gongo F.5. Eva Kyokusimiire 0 25 S 30 7 E 3845 257. bombo Nakasongola Nakitoma Kigweri Kimatwe F.1 Sekiganda Alex 1 29 N 32 7 E 3520 258. Bukalasa Bushenyi Igara west Kyamuhunga Gongo F.4. Eliphaz Kangyenyenka 0 25 S 30 7 E 3845 259. Unknown 26 Bushenyi Bunyaruguru Kicwamba Kicwamba H/Q F.6. Kicwamba s/county HQ 0 14 S 30 5 E 2893 260. Rutuga Bushenyi Igara west Nyabubaare Kigoma Kyomya F.2. Atukunda Jovinta 0 31 S 30 6 E 4157

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262. Kwata akasero Rakai Kooki Byakabanda Kasiika Kitaasa F.1: Agnes Nalumansi 0 44 S 31 22 E 4353 263. Unknown 58 Kibaale Buyaga Mabaare Nyansoro F17. Katarwa Anatoli 1 3 N 30 30 E 3952 264. Real Teraka Mukono Kyampisi Bulijjo Kitanda F.2 Mwasanje Kizito 0 29 N 32 45 E 3929 265. Unknown 72 Masindi Ihungu Karujubu Nyamagisa Karujubu LC1 F30. Mariko Kaahwa 1 40 N 31 39 E 3611 266. Unknown 66 Hoima Kitoba Bugahya Kiragura Dwoli F.22 Yoram Byeitima 1 30 N 31 21 E 3817 267. Rujumba Kibaale Buyaga Mabaare Nyansoro F17. Katarwa Anatoli 1 3 N 30 30 E 3952 268. Unknown 59 Kibaale Buyaga Rugashare Buroro Kyabasazima F.18 Simon Kaguru 1 4 N 30 55 E 3573 269. Unknown 24 Bushenyi Igara west Kyamuhunga Gongo F.5. Eva Kyokusimiire 25 S 30 7 3845 270. Unknown 22 Bushenyi Igara west Nyabubaare Kigoma Kyomya F.2. Atukunda Jovinta 31 S 30 6 4157 271. Unknown 35 Masaka Muduuma Sabagabo Kisoga Namabale F.3 Elizabeth Zawedde 0 20 S 32 21 3958 272. Unknown 54 Kibaale Buyaga Kyanaisoke Kyenzige hapida F.13 Juliana Twinonbusingye 0 58 N 30 50 E 4035 273. Komanda Masaka Mawokota Muduuma Buyala F.1 Kalanzi George 0 19 S 32 24 E 3901 274. Unknown 1 Rakai Kooki Byakabanda Katerero B F.2: Mukyala Namugerwa 0 45 S 31 25 E 4328 275. Kalitunsi Rakai Kooki Byakabanda Kasiika kitaasa F.1: Agnes Nalumansi 0 44 S 31 22 E 4353 276. Unknown 123 Mukono Kyaggwe Ntenjeru Ntanzi Ntanzi F.7 Walusimbi George 0 12 N 32 48 E 4050 277. Mureefu Bushenyi Igara west Kyamuhunga Gongo F.4. Eliphaz Kangyenyenka 0 25 S 30 7 E 3845 278. Unknown 20 Masaka Bukoto west Kito Lwengo Luti F.8. Richard Mujumbwa 0 32 S 31 38 E 4481 279. Unknown 81 Rakai Kakooge Kyabutaik Kakooge Kyabutaik F.1 Wanyana Florence 1 5 S 32 29 E 3524 280. Unknown 55 Kibaale Buyaga Kyanaisoke Mugalike health Centre F.14 Mwesige Pascavia 1 0 N 30 52 E 3962 281. Unknown 78 Nakasongola Nakitoma Bujabe Bugaramura F.2. Yorokamu Byarufu 1 31 N 32 0 E 3508 282. Unknown 74 Nakasongola Nakitoma Kigweri Kimatwe F.1 Sekiganda Alex 1 29 N 32 7 E 3520 283. Ssenyonjo Nakasongola Nakitoma Kigweri Kimatwe F.1 Sekiganda Alex 1 29 N 32 7 E 3520 284. Kawanda 1 Mubende Mityana Mityana TC F.6 Okot Betty 0 23 N 32 4 E 4304 285. Unknown 77 Nakasongola Nakitoma Kigweri Kimatwe F.1 Sekiganda Alex 1 29 N 32 7 E 3520 286. Unknown 16 Masaka Bukoto west Kingo Kaganda F.7. Kayira (omusomesa) 0 2 S 31 36 E 4380 287. Kawanda II Mubende Mityana Mityana TC F.6 Okot Betty 0 23 N 32 4 E 4304 288. Kawulu Kamuli buyende Buyende Wesunire kinambugo F.5. Kinambugo 1 12 N 33 8 E 3582 289. Kagadi 3 Mpigi Mawokota Muduuma Buyala F.2 Disan Iga 0 19 N 32 23 E 3908

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