Reviewing germplasm molecular data from the International Coconut Genebank for Africa and Indian Ocean (ICG-AIO) and its breeding program.

Marc Delorme Coconut Research Centre
CNRA (Centre National de Recherche Agronomique)

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I. Summary

This 2-day technical consultancy made an inventory of coconut germplasm molecular analyses at the Marc Delorme Research Station, Port Bouët, Côte d'Ivoire. Its objective was to prepare for the advent of a new method for characterizing coconut genetic diversity, by studying the possibilities of linking past and future analyses. We have reconstructed a unique identification key for the concerned palms. A total of 928 palms were subject to DNA analysis, 764 (82%) of which are still alive and can be re-sampled if necessary. Of these, 152 palms (20%) have a complete set of phenotypic observations and are the most interesting to re-analyze. The report also makes suggestions regarding methods to be developed and proposes to take samples for certain genetic tests before these palms-of-interest disappear.

II. Introduction

This report was requested in preparation for new molecular analysis techniques that will be used to assess the genetic diversity of coconut palms. We envisage moving from the current SRR Kit technique (15 markers developed in the 1990s) to more advanced techniques as they become available. For the maintenance and enrichment of a coconut palm molecular database, it was considered useful to establish bridges and references between the data collected and analyzed with the old technique, and the data that will be obtained and analyzed with new techniques.

At CIRAD, it seems that the leaf and DNA samples collected over the past twenty years will not allow repeat analyses with more modern techniques. The objectives of the mission carried out at the Marc Delorme station are therefore to:

1. Provide a list of palms meeting the following criteria:
    i) have already been subject to molecular analysis
    ii) remain alive
    iii) have received effective and meaningful phenotypic characterization.
2. Make recommendations concerning the samples and molecular analyses to be carried out at the Marc Delorme station.

III. Where we are now

Regarding genetics and selection activities, the coconut palms planted at the Marc Delorme station can be divided into four types:

1. Palms in the **collection**. These are mainly accessions appearing in the list of the ICG creation contract, drawn up in 1999 (See the detailed list available in the 2021 ICC-AIO appraisal report).
2. Palms in **experimental trials** containing advanced genetic resources. This plant material is in various genetic tests and its outright abandonment would represent a considerable loss for the future of genetic improvement of coconut palms in Côte d'Ivoire and in the world. It would also be a considerable loss of financial and human investment. More than 2 million field observations have been made over a 20-year period on these genetic trials, which represents a cost of more than one million USD. It is also the best material for marker-assisted selection. It can be expected that *in vitro* vegetative propagation (cloning) methods will advance and make it possible to further benefit from these trials.
3. Palms in the **multiplication fields**. These are self-progeny families, each derived from parents belonging to four Tall-type accessions: Tahiti, Rennell Island, Vanuatu, and West African. They result from the self-fertilization of the parents who have been individually tested for their combining ability in large genetic experiments - each covering around ten hectares and being observed for at least

twelve years. In the CNRA seed production system, pollen should be collected only from the self progenies from the best parents, ensuring a production gain of around 20 to 25% compared to first generation of hybrid seednuts. Many of these progenies are endangered.

4. Palms in the **seed gardens**. These are fields, generally planted in isolation, along with Dwarf coconut palms which serve as mother trees to produce hybrid seednuts, improved or not. They help improve the productivity of the coconut palm in Côte d'Ivoire and, by selling hybrid seednuts, provide financial resources to the Station.

A. Checking the identity and genealogy of the palms

At the Marc Delorme center, each palm is identified by a unique key composed by the numbers of the field, row in the field, palm in the row, and year of planting. Then other information available includes a progeny number, the cultivars used as mother and father palms, and data about the experimental design. We can take the example of the unique identification keys of two palms: a) 072 03 16 1980 and b) 072 03 16 2009. The palm identified as 072 03 16 1980 was a hybrid West African Tall x Rennell Island Tall from the progeny PB02575, planted in 1980. Then the field was cut and replaced in 2009 by regenerated accessions. Now, the palm 072 03 16 2009 is a Malayan Tall from the progeny PB3427. This palm is still alive.

For our calculations, the first step was to bring together in a single file the information on the identity and genealogy of all the palms located in the collections and experiments sampled for DNA. This step would have been easy if the data in the CDM (Coconut Data management) software were available and updated, but it was not. It was therefore necessary to seek out and group together information dispersed in many directories and in different formats. The successive steps were:

1. We extracted from the CDM file TREES.DBF a set of 16,139 palms planted from 1968 to 2002 in 13 plots. These are the old accessions of the collection, and the concerned field numbers are: 060, 070, 081, 083, 091, 092, 101, 102, 111, 112, 132, 142, M63.
2. From the DBF files prepared during the regeneration project, we merged the identities of palms located in fields 042, 062, 063, 072 and 073 and we obtained a total of 7726 palms planted between 2007 and 2011. There are all the palms of the regeneration accession.
3. In the 2000's, a set of molecular analysis were conducted during a study devoted to the construction of a linkage map of the Rennell Island Tall and QTL analysis (Lebrun et al., 2001). We reorganized and standardized the data sent by Luc Baudouin. These data concerned 91 palms from the experiment PBGC25 planted in the field M51 on rows 33 to 36.
4. Some palms WAT and RIT were sampled in fields 035 and M61, so we added the identity of 2372 palms planted in these fields. In plot 083, 4 hybrid palms were also sampled for DNA so we added a set of 659 hybrid palms from plot 083
5. More recently, a new study was launched on palms from a cross MYDx(MYDxWAT) planted in October 2016 in field 122. Dr Luc Baudouin provided only a field map indicating the palms sampled. We had to generate a file from this map, enter and standardize the data. These DNA analyzes concern 236 palms in field 122.

The resulting combined file (named IDENALL.DBF) includes the identities of 28,413 coconut palms planted in all the fields cited up where DNA analysis was conducted.

B. Palms sampled for DNA analysis.

CIRAD has stored molecular data on the coconut palm in the TROPGEN database, available at the URL: https://tropgenedb.cirad.fr/tropgene/JSP/index.jsp. We first worked on the content of this database, but in January 2021 it only identified 64 palm trees as analyzed from Côte d'Ivoire. The

CNRA interacted with CIRAD (C. Hamelin and Luc Baudouin) to make the content of this database more accessible. CNRA also requested additional data from CIRAD.

Dr Luc Baudouin send us an Excel file containing a larger set of data from palms sampled in Côte d'Ivoire. This set was kindly completed by two additional sending, the first concerning the few analyses realized during the regeneration project and the second related to the international breeding experiment in field 122 (both received in January 2020). This Excel file did not contain the accurate unique identification keys for concerned palms, but only field, row, tree, without planting year and provided in different formats[1] depending on years and experiments.

We have worked to reconstruct the unique identification key for these palm trees (Plot, row, tree, year of planting) from this file. This rather long step was necessary to be able to connect the molecular data to all the other data available on these same trees.

1. Molecular data on old accessions.

According to the available data, 368 palms from old accessions planted between 1969 and 1997 (including two palms with identification to be verified [2]).

2. Molecular data collected during the regeneration project.

During the last regeneration project, an experiment tried to assess the effectiveness of controlled pollinations conducted on ageing accessions in the International Coconut Genebank for Africa and the Indian Ocean (ICG -AIO). The study addressed the main following research question: Are the genotypes of the individuals of the progeny compatible with the genotype of the parent palms from which they are said to be derived?

Molecular analyses were conducted in three labs, CNRA, CIRAD and CEFE (Centre d'Ecologie Fonctionnelle et Evolutive). The results showed that, using the same SRR markers, the three laboratories assigned different molecular profiles to the same samples[3]. Thus, in the opinion of the expert, these results simply showed that the molecular analyses performed by at least two of the three laboratories involved (without it being possible to determine which ones) were too imprecise, and ineffective to answer our question. These analyses also showed that according to

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[1] It was often only a field type « row field » with values such as 2407 for the palm M63 24 07 1982. One of the most complicated field to deals with was 091, because TAT palms were planted in the same physical location (row, palm) in 1969 and 1988. The analysis indicates that palms sampled for DNA were all planted in 1988, to be checked again by Dr Luc Baudouin if possible.

[2] Three mistakes in the original Excel were identified: 1) "SIT","SIT 102 2305" No Solomon Island Tall is planted in field 102. May be Sri Lanka Tall, but 102 23 05 1980 is a Tagnanan Tall. 2) "TAGT 83","083",5,22,0,"". No Tagnanan tall at 083 05 22 or 083 50 02, last tree on row 05 is 17. 3) MYD 132 29 16 is duplicated in the file, we removed one.

[3] Dr Baudouin is the researcher who was in charge of the first set of analyse. His opinion is as follow: the first analysis was mostly correct from a purely technical point of view. I could spot probable GMZ, GNG4 and GPY1. The problem is that these genotypes didn't match the palm identifiers. In other words, genotypes were somehow mislabelled. The second and third analysis were generally in agreement except that in some cases the lengths assigned to alleles differed (binning error). Palm numbers are written on the samples and on a label in the pouch where it is placed. Sampling mislabelling may occur occasionally, not systematically. A more likely explanation is that mixing occurred during seednuts handling or at planting time. Palms assigned to e.g., GMZ were effectively GMZ but did not descend from their purported parents. Ensuring that each individual palm is effectively at the right place requires extra care and probably requires refining planting procedures.

the results of the three laboratories, none of the offspring tested seemed to come from the designated parents. It would be understandable if the controlled fertilization technique had a certain error rate, but it is extremely unlikely that this error rate would be 100%. The origin of these surprising and worrying results could be due to another type of error, for example a mixture in the numbering of the samples during the foliar sampling.

The mystery of these results has never been solved. Therefore, the results of the three laboratories should be carefully preserved; and resampling of some of these palms should be conducted to carry out a fourth check in order to understand what really happened. Anyway, launching this study prove to be useful, because it has inspired studies in COGENT countries, and these studies helped to limit reproductive errors in plant material (Rajesh et al., 2012; Preethi et al., 2016; Bandupriya et al., 2017; Azevedo et al., 2018).

It was initially planned to analyze 200 DNA samples in Côte d'Ivoire, and 50 control analyses in CIRAD. Then, taking into account diverging results, a supplementary control was planned at CEFE laboratory in Montpellier. A total of 238 palms were initially selected for leaflet sampling, but only 190 palms were analyzed in rejuvenated accessions, as follow:

- Gazelle Peninsula Tall (GPT) called in French "Grand Nouvelle Guinée (GNG01)", regeneration located in field 063, 71 palms.
- Tahitian tall (TAT) called in French "Grand Polynésie 1 (GPY01)", regeneration located in field 062, 58 palms.
- Mozambique Tall (MZT) called in French "Grand Mozambique (GMZ)", regeneration located in field 072, 61 palms.

Two other palms were used as control for DNA analysis were: WAT (GOA) M63 24 07 and MYD (NJG) 092 07 25 (already in the list of sampled palms in old accessions). The parent palms are also listed among those of old accessions. List of these palms is provided in annex ZZ. As three palms were already in previous lists (132 29 16; M63 41 04; M63 41 10), the number of palms added for this experiment was 136 (46 parents and 190 progenies)

3. Molecular data in breeding experiments

The first study of this kind was devoted to the construction of a linkage map of the Rennell Island Tall and QTL analysis (Lebrun et al., 2001). The data is on 91 palms from the experiment PBGC25 planted in the field M51 on rows 33 to 36 only,

The second study is the international experiment planted in Field 122. The palm development in this field is weak and heterogeneous. Even the Dwarf palms planted in 2016 did not start to produce in 2021 (5 years after planting); well cultivated Dwarf types start to produce at 3 years. As Cirad still conserves the DNA of all these recently sampled palms, inventory was not conducted in this field, but a satellite picture is available in figure ZZ. We had to extract a list of palms from the map, and we found 236 palms sampled for DNA. Because of weak development, some of these palms may have been replaced but we do not have all the details.

Figure 1. Map of the field 122 provided by Dr Luc Baudouin and satellite picture from November 2020.

Essai de phénotypage BC1

Parcelle 122

Planté en novembre 2016

BC1 phenotyping trial

Field 122

Planted in November 2016

N

arbre/tree number

ligne/row	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	1243	875	1246	1266	1262	1259	1245	1272	1275	950	1274	850	1289	852	1282	1198	1191	1187	1174	1181	1185	1087	975	1098	973	6R
2	1137	1232	1046	1244	1250	944	1258	1051	1278	1053	853	1178	1283	1288	1182	1196	1175	1195	1186	1179	974	987	1096	881	1090	
3	1234	929	HYB	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	MYD	HYB	1039	894
4	1228	1219	HYB	MYD	1031	1126	1131	1032	1124	1117	1114	1108	1119	1118	924	960	927	904	878	926	957	MYD	HYB	6R	902	
5	1235	1240	HYB	MYD	601	218	443	431	433	300	261	209	263	177	301	446	449	171	173	259	212	501	MYD	HYB	995	897
6	1260	1261	HYB	MYD	1112	258	260	299	174	340	268	180	308	306	266	213	179	222	293	304	955	MYD	HYB	966	806	
7	943	1208	HYB	MYD	533	347	350	479	215	312	313	277	234	275	355	459	186	309	270	219	341	492	MYD	HYB	908	1030
8	1218	1041	HYB	MYD	1003	353	310	274	348	413	447	343	231	315	187	188	307	183	228	303	925	MYD	HYB	1018	1017	
9	1221	1155	HYB	MYD	487	429	230	428	441	276	286	363	281	238	237	181	227	262	223	271	342	493	MYD	HYB	930	1012
10	1134	1151	HYB	MYD	1079	344	351	474	427	440	178	192	339	448	189	356	221	451	430	472	972	MYD	HYB	1014	1010	
11	1215	1211	HYB	MYD	535	194	424	196	475	320	242	240	321	371	197	316	466	469	461	465	454	481	MYD	HYB	1230	1363
12	1207	1226	HYB	MYD	1102	409	385	243	389	397	317	285	322	246	198	245	290	369	257	462	965	MYD	HYB	921	931	
13	1360	1209	HYB	MYD	503	404	402	401	387	399	410	400	207	396	432	294	248	249	328	368	370	489	MYD	HYB	935	941
14	1203	1213	HYB	MYD	1054	398	390	206	204	377	411	378	376	374	296	330	331	292	199	367	938	MYD	HYB	942	939	
15	1039	1156	HYB	MYD	536	442	380	391	202	201	200	373	382	467	412	253	333	366	372	291	251	499	MYD	HYB	847	947
16	1205	1162	HYB	MYD	1030	1256	959	846	983	1050	434	435	439	473	423	415	418	416	420	414	871	MYD	HYB	855	1056	
17	695	1204	HYB	MYD	538	483	486	490	491	494	495	497	498	500	502	504	505	506	512	513	519	496	MYD	HYB	1060	860
18	1148	1200	HYB	MYD	1043	520	521	522	524	540	543	544	553	560	564	566	568	575	578	581	978	MYD	HYB	959	1058	
19	1044	1201	HYB	MYD	484	591	594	595	600	602	603	606	609	610	613	616	618	619	620	626	945	1052	MYD	HYB	870	890
20	1153	1152	HYB	MYD	1019	627	632	633	636	637	638	640	642	643	644	645	646	966	1066	1071	1047	MYD	HYB	954	1069	
21	1008	1150	HYB	MYD	906	1005	936	1033	1107	1092	726	992	1129	970	986	905	954	872	928	903	1001	MYD	MYD	HYB	954	1069

Legend

MYD	Plant NJM hors essai	MYD off-trial plant
HYB	Plant PB121 hors essai	PB121 (MAWA) off-trial plant
1008	Plant BC1 hors essai (5e ou 6e récolte)	BC1 off-trial plant (5th ou 6th harvest)
6R	Plant BC1 hors essai (6e récolte), pas de numéro	BC1 off-trial plant (6th harvest, number unavailable)
194	Plant BC1 en essai (4e récolte)*	BC1 plant in trial (4th harvest)*
483	Plant BC1 en essai (5e récolte)*	BC1 plant in trial (5th harvest)*
	* 213 plants cartographiés ont leur n°	* 213 mapped individuals have their number

4. Balance of palms sampled for DNA

After checking all, we obtained a file (BaseDna.DBF) of 928 palms sampled for DNA analysis. The identity of these palms was verified and they unique identification key was reconstructed. The origin of these palms is listed in the following table. The complete list of these palms is given in annex.

Table 1. Origin of palms sampled for DNA analysis at the Marc Delorme Centre

	Source	Code	Number of palms
1	Old accessions of the genebank planted in fields: 060, 070, 081, 083, 091, 092, 101, 102, 111, 112, 132, 142, M63 (including two unidentified palms, see note).	OldA	395
2	Rejuvenated accessions	RejA	190
3	WAT and RIT sampled in fields 035 and M61	Poll	12
4	Hybrid palms planted in plot 083 (2 PB121 and 2 PB111)	Hyb	4
5	Progeny MYDx(MYDxWAT) planted in 2016 in field 122	G122	236
6	Experiment PBGC25 planted in field M51 – Hybrids Dwarf x Rennell Island Tall	G025	91
	Total		928

C. Making a new inventory/counting of living palms

In January 2021, the inventories carried out over the past two years did not allow us to precisely determine the status of each tree in the collection and in the experiments. Technicians used the following method: they use the field maps and note on the plan the overall number of living and dead trees by row or accession, without indicating the precise position of the dead trees. It was therefore not possible to know the individual status of each tree. We therefore asked for a more precise inventory, with tree-by-tree data. These inventories have been done. The task was not easy because all the identification numbers (row, row of the tree on the row) painted on the trees are erased. More details are given in the ICC-AIO 2021 appraisal report.

In addition to the inventory of the genebank, counting was also achieved in field M51, a genetic experiment where many DNA analysis have been done. Fields 035, 083, M61 and 122 (few palms or recent sampling, see previous table) where not inventoried. These inventories allowed to calculate that, among the 928 palms sampled for DNA at Marc Delorme Research Centre, 764 are still alive.

D. Characterization data of palms sampled for DNA

We wrote a FoxPro procedure MISEJOUR.PRG (available in annex D), that allowed us to gather all data and specify the different kinds of information available for each palm.

1. Bunch and fruit harvest.

This information is normally stored in a unique file (BUNCH.DBF from the CDM Software) which contains data on more than 4 million harvests of individual palms. As detailed is the ICC-AIO assessment report, instead of being in a unique file, data is scattered in numerous incomplete files. As the recording of harvest did not start in 2021 in rejuvenated accessions and field 122 (See ICC-AIO report), we use our version of the file Bunch.dbf dated August 2010 and containing 47016761 data. Among all palms sampled for DNA, 484 have already been harvested - considering that rejuvenated accessions and young palms field 122 are not yet included.

2. Fruit component analysis.

This information is normally stored in two files with same name in two directories (Fruit..DBF from the CDM Software) which contains data on more than 170000 fruit analyses made on individual palms or on experimental plots. As detailed is the ICC-AIO assessment report, instead of being in a unique file, data is scattered in numerous incomplete files. As the recording of harvest and fruit analysis did not start in 2021 in rejuvenated accessions and field 122 (See ICC-AIO report), we use our version of the file fruit.dbf dated June 2010 and containing 174115 fruit analyses data. We also added palms from field M51 as all analysed for fruit component, as a special batch of fruit analysis was done on them. Among all palms sampled for DNA, 277 have been studied for fruit analysis - considering that rejuvenated accessions and young palms field 122 are not yet included.

3. Stem, leave and inflorescence.

Available data for stem, leave and inflorescences concerns only the old accessions of the collection, so 395 palms among the 928 sampled for DNA. Data are in the directory collecti/pbdata/ov, conserved by R. Bourdeix. Copy of this directory was released back several time to CNRA researchers. Data is organized in separate files for each accession in each field. We gathered all the available data in a unique file named treesov.dbf and containing 1972 palms. It was not possible to consider the observations made on the rejuvenated accessions. It seems that little data has been collected so far on these trees, and their entry was not accessible within the time limit set for the mission. Among all palms sampled for DNA, 207 have been characterized for stem, leave and inflorescence - considering that rejuvenated accessions and young palms field 122 are not yet included.

IV. Where we want to be

A. Cross-checking databases of field inventories, DNA analysis, observation of vegetative traits, and fruit and bunches

For each palm planted in the collection of Côte d'Ivoire, we gathered the following data scattered in different database in a dedicated file (baseDNA.dbf) containing the information summarized in table hereunder.

Table 2. Data on palms sampled for DNA analysis at the Marc Delorme Centre

Source	**Code**	**Palms sampled for DNA**	**Alive palms**				
			All alive	With harvest	With fruit an.	With stem etc.	With All data
Old accessions	OldA	395	315	315	219	179	152
Rejuvenated accessions	RejA	190	139	0	0	0	0
Field 035 and M61	Poll	12	12	12	0	0	0
Plot 083 (2 PB121 and 2 PB111)	Hyb	4	4	4	0	0	0
Field 122	G122	236	236	0	0	0	0
Field M51 PBGC25	G025	91	58	58	58	0	0
Total		928	764	389	277	179	152

Among the 938 palms sample for DNA analysis, the number of "perfect" alive palms is presently 152, and all are from old accessions. These palms were already analyzed for DNA using COGENT SRR kit; they are still alive in February 2021; they all have data for fruit and bunch return, fruit analysis, and characteristics of stem, leaves and inflorescences. Such "perfect" palms (and the ones where only few data are missing) should preferably be resampled for developing a more powerful molecular technique of characterization of coconut genetic diversity.

Our advice is to harvest these "perfect" palms as soon as possible and to keep the samples in cryopreservation for future analyses. If these trees ever die before being resampled, an important source of information will be lost. Annex gives the detailed list of all palms with living status and balance on what was observed.

B. Sampling in best breeding experiments before they disappear.

The Marc Delorme Center had set up a vast network of genetic tests intended to improve the best coconut hybrids. These experiments, which covered more than two hundred hectares, were designed with great care and observed in great detail for more than 15 years. These experiments constitute a set of data that is unique in the world. They remain very insufficiently exploited in terms of scientific publication. At present, according to expert opinion, none of the coconut breeding centers in the world have the capacity and the means to repeat similar experiments. Even if a center succeeds in redoing similar experiments, it will take 12 years to have the results of these experiments.

Hybrids which are considered 'best' between traditional varieties have been improved using the individual combining ability testing method, which takes advantage of the genetic variability within Tall varieties (Gascon and De Nuce de Lamothe 1976). This can be explained using the following example: PB113 is hybrid developed by crossing the CRD (Cameroon Red Dwarf) and a selected population of RIT (Rennell Island Tall). Their excellent performance has been further enhanced. Forty-five RIT parent palms have been individually crossed with CRD. The progenies obtained are therefore, half-sib families each from one RIT as male and several CRD as female. In the absence of a secure cloning method that does not destroy the sampled palms; the individually tested male parents have been conserved and multiplied by selfing. The best self-families, each constituted of about 100 are conserved as pollen donors for seednut production. The results of these experiments show that selecting the best families give 15 to 30% genetic progress on yields (Bourdeix et al. 1989). It is to be noted that these experiments were mainly planted in Côte d'Ivoire before 1990. Vanuatu also planted a few experiments but has not yet released their results to farmers.

In Côte d'Ivoire, the network of genetic experimentations includes individual tests of male parents from four cultivars: West African Tall (WAT), Rennell Island Tall (RIT), Tahitian Tall (TAT) and Vanuatu Tall (VTT). All these progenies are important for different reasons and different regions of the world. So, we strongly suggest harvesting and keeping in cryopreservation 1000 to 3000 DNA samples from these experiments. The protocol and the exact number of palms to be sampled cannot be determined in this short study and require additional work. Funding for analyzing these samples will be easy to obtain, but if palms dye before being sampled, all will be lost.

To help and train the CNRA breeder, we have prepared tables that summarize hybrid improvement experiments for WAT and RIT. These tables are important both for future publications, for the reproduction of endangered best parent palms, and for harvesting pollen for production of improved hybrids. A third table for TAT parent palms is under preparation.

Table 3. Rennell Island Tall - Progeny numbers of the half-sib families tested in experiments GC16, 20 and 25 and location of the self progenies for pollen production

Nb: number of palms planted

Parent palm number	Half-sib progeny numbers in the three experiments			Best	Location of the self progenies (field M60)	
	GC16	GC20	GC25			Nb
P01842	PB02577	PB02546	PB02822			
P01846	PB02584	PB02548	PB02829			
P01854	PB02585	PB02549	PB02830			
P01867	PB02578	PB02550	PB02823			
P01868	PB02579	PB02555	PB02824			
P02054	PB02572	PB02544	PB02817	2	Row 1 to 4	104
P02062	PB02573	PB02547	PB02818			
P02078	PB02575	PB02558	PB02820			
P02550	PB02576	PB02551	PB02821			
P02556	PB02586	PB02553	PB02831	3	Row 37 to 40	104
P02589	PB02580	PB02556	PB02825			
P02591	PB02581	PB02557	PB02826			
P02654	PB02583	PB02545	PB02828			
P02664	PB02574	PB02552	PB02819	1	Row 33 to 36	104
P02665	PB02582	PB02554	PB02827			

Table 4. West African Tall - Progeny numbers of the half-sib families tested in experiments GC15, 26, 28 and 31 and location of the self progenies for pollen production

Parent palm number	WAT Half-sib progeny numbers in the four experiments					Location of the self progenies (field M93)	
	GC15	GC26	GC28	GC31	Best		Nb
P02669	PB02514		PB02932				
P01956	PB02515		PB02933				
P01958	PB02516		PB02934				
P01433	PB02517		PB02935				
P01955	PB02519		PB02937				
P01959	PB02519		PB02936				
P00985	PB02520		PB02938				
P03144	PB02521		PB02939				
P01436	PB02522		PB02940				
P00992	PB02523		PB02941				
P02683	PB02524		PB02942				
P00994	PB02525		PB02943		2	Rows 14 to 18	96
P03145	PB02526		PB02944		1	Rows 19 to 25	91
P03146	PB02527		PB02945				
P03147	PB02528		PB02946		3	Rows 32 to 35	42
P00535		PB02868		PB03858	To be calculated		
P00788		PB02866		PB03056			
P00851		PB02867		PB03057			
P00968		PB02874		PB03064			
P00977		PB02877		PB03067			
P01108		PB02869		PB03059			
P01184		PB02870		PB03060			
P01185		PB02871		PB03061			
P01186		PB02872		PB03062			
P01195		PB02865		PB03055			
P01957		PB2874		PB03065			
P01965		PB2879		PB03069			
P01994		PB2876		PB03066			
P02667		PB2873		PB03063			
P02681		PB2878		PB03068			

C. Technique for collecting and conserving samples for molecular analysis.

The technique for collecting and storing samples for DNA analysis must be adapted to the new technology that will be used. For the different research teams to stay connected and compare their results, this technique should be the result of an international consensus through the COGENT network. In addition, there would be an interest in developing a method that is common to coconut diversity analysis and phytoplasma analysis. From this perspective, a tissue sample from the trunk (stem) seems more suitable. This type of harvesting is easier to perform since

many trees are very tall and the leaflet harvest is not easy. If taken from the stem, the samples collected for diversity analysis can also be used for phytoplasma analysis, and vice versa.

A priority task for Cogent ITAGS seems to agree on a common standard technique. Indeed, it would be useful to sample many palms at the Marc Delorme Centre, and these palms are in risk to being cut or dye. Before starting such operations, the sampling and conservation technique should netter be specified and be the subject of an international consensus. The preservation technique can relate to organ samples, or to the DNA extracted from these samples if efficient quality tests of this DNA are carried out.

D. Towards a new method for DNA analysis of coconut diversity.

The choice of a new method of molecular analysis for coconut diversity is beyond the scope of this report. The chosen method should be the subject of a consensus within the COGENT and be described in guidelines established under the responsibility of the ITAG (International Thematic action group) dedicated to this subject. Researchers from different countries have a major interest in agreeing on a common technique, as this will allows comparison and common analysis of different datasets.

E. Estimate of the cost for collecting and storing samples.

The cost of collecting and storing samples will depend on the technique chosen by international consensus. If sampling is made from the stem, the cost of collecting, processing, and storing samples can be estimated at between one and two dollars per tree, not including the equipment necessary for these actions. This equipment consists, for example, of a cordless drill (in the case where stipe samples are taken), an oven or a freeze drying allowing the dehydration of the samples (in the case where these samples must be dehydrated), and a freezer or a cryopreservation system based on liquid nitrogen to keep them cold.

V.As a conclusion

At a time when analysis techniques are rapidly evolving, it was important to carry out an inventory of DNA analyzes at the Marc Delorme center and to determine which trees can be analyzed again to establish bridges between the old and future databases. data. We have identified a total of 928 palms subjected to DNA analysis, 764 are still alive and can be re-sampled if necessary. Of these, 152 palms have a complete set of phenotypic observations and are the most interesting to re-analyze.

The report also makes suggestions regarding methods to be developed and proposes to take samples in certain genetic tests before they disappear. According to expert opinion, it is of crucial importance to take samples for DNA analysis in the improvement tests of the best hybrids. A total of between 1000 and 3000 samples would probably have to be taken out of the ten tests concerned. It will be easy to find funding to analyst these samples.

If we are promoting the use of genomic data in coconut breeding e.g., by genome wide association studies (GWAS), the critical point is the availability of observation data. There is no reason to limit the scope to trees which were analyzed with SSRs. Some other trees may already have a more complete observation dataset.

Many things could be improved at Marc Delorme Research Station. The most obvious one lies in data collection, preservation and management. The author had often to use his personal data because they were no longer available at the station.

The breeding division lacks adequate access to computers (both machines and operators). Data should be systematically computerized as soon as possible and regularly backed up. The information flow is outdated and many documents already copied to clean once or twice remain

sitting on shelves and waiting for computerization… Ideally data should be collected in the field using tablets, checked and conserved in hard disks with frequent backups. Even though this cannot be realized in the near future, improvements to the current scheme should be considered.

Another point is to reinforce the procedure to ensure correct individual palm identification at plantation. This is clearly illustrated by the “Molecular data collected during the regeneration project” section.

Many interesting genotypes lack data on the traditionally observed traits, and observation campaigns should be launched. Moreover, the emergence of high added-value products on the market should prompt breeders to put more stress on quality traits, probably using advanced analytic methods such as NIRS.

Collecting DNA from the stem was attempted in Ghana, it *seems* to work but we suggest waiting for the final results before making it a standard method.

Regarding footnotes of p. 5: We did our best to preserve the passport data we received with the samples. Errors may occur occasionally, at either end of the transmission chain but we trust the number is low.

If you meet a donor and say: I have huge experiments which has been carefully maintained and observed for over 12 years, all the results of the field measurements are available; but I have DNA samples which are not yet analyzed and which could provide valuable data and very effective selection tools; then the donor will very probably fund you.

VI. Technical annexes.

A. References

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B. Global list of palms sampled for DNA

Table 5. List of living palms with DNA analysis and their status for observations of bunches and fruits, fruit component analysis and vegetative characteristics (stem, leaf and inflorescence).

Legend

Types: OldA: old accessions; RejA: Rejuvenated accessions; Pol: WAT and RIT in fields 035 and M61; Hyb: Hybrid palms in field 083: G122: Backcross in field; G025: Experiment PBGC25 in field M51

Alive: if Y living palm; **Bunch:** number of bunches harvested; **Fruits:** number of fruits analyzed; **Stem:** if Y, the palm was characterized for leaf, stem and inflorescence.

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
1	OldA	WAT	M63 24 7 1982	Y	69	129	Y
2	OldA	WAT04	M63 24 14 1982		69	130	Y
3	OldA	WAT04	M63 26 5 1982	Y	69	109	Y
4	OldA	WAT04	M63 26 17 1982	Y	69	76	Y
5	OldA	WAT04	M63 27 8 1982	Y	69	123	Y
6	OldA	WAT04	M63 27 13 1982	Y	69	91	Y
7	OldA	WAT04	M63 27 19 1982	Y	69	125	Y
8	OldA	WAT04	M63 28 7 1982	Y	69	133	Y
9	OldA	WAT04	M63 28 14 1982	Y	69	119	Y
10	OldA	WAT04	M63 28 20 1982	Y	69	109	Y
11	OldA	WAT06	M63 30 10 1982	Y	69	129	Y
12	OldA	WAT06	M63 30 15 1982	Y	69	135	Y
13	OldA	WAT06	M63 31 14 1982	Y	69	133	Y
14	OldA	WAT06	M63 32 15 1982	Y	69	128	Y
15	OldA	WAT06	M63 33 6 1982	Y	69	123	Y
16	OldA	WAT06	M63 33 10 1982	Y	69	138	Y
17	OldA	WAT06	M63 33 16 1982	Y	69	114	Y
18	OldA	WAT06	M63 34 8 1982	Y	69	120	Y
19	OldA	WAT06	M63 34 9 1982	Y	69	124	Y
20	OldA	WAT06	M63 34 14 1982	Y	69	132	Y
21	OldA	MLT	M63 49 10 1982	Y	69	102	Y
22	OldA	MLT	M63 50 12 1982	Y	69	91	Y
23	OldA	PNT01	M63 4 6 1980	Y	69	70	Y
24	OldA	PNT01	M63 5 6 1980	Y	69	59	Y
25	OldA	NLAD	092 18 20 1978	Y	216	50	Y

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
26	OldA	NLAD	092 20 16 1979	Y	215	0	
27	OldA	MYD	132 30 18 1982	Y	220	0	Y
28	OldA	MGD	142 45 6 1983	Y	182	0	
29	OldA	MGD	142 46 3 1983	Y	182	0	
30	OldA	CATD	092 26 16 1980	Y	214	81	
31	OldA	CATD	092 26 22 1980	Y	214	68	
32	OldA	MRD	132 38 22 1982	Y	220	0	Y
33	OldA	MRD	132 39 19 1982	Y	208	0	Y
34	OldA	TAGT	102 19 5 1974	Y	111	85	
35	OldA	TAGT	102 19 6 1974	Y	111	0	
36	OldA	SIT	102 0 17 0		0	0	
37	OldA	SIT	102 23 5 1974	Y	111	0	
38	Poll	RIT	M61 11 4 1980	Y	70	0	
39	Poll	RIT	M61 11 7 1980	Y	70	0	
40	OldA	MYD	092 7 15 1978		72	0	Y
41	Hyb	PB111	083 15 22 1978	Y	7	0	
42	Hyb	PB121	083 41 2 1997	Y	22	0	
43	Poll	WAT	035 22 7 1980	Y	70	0	
44	Poll	WAT	035 22 12 1980	Y	70	0	
45	Poll	WAT	035 23 3 1980	Y	70	0	
46	Poll	WAT	035 23 13 1980	Y	70	0	
47	Poll	WAT	035 23 19 1980	Y	70	0	
48	OldA	MYD	092 7 21 1978		72	0	
49	Hyb	PB111	083 21 23 1978	Y	7	0	
50	Hyb	PB121	083 40 4 1997	Y	22	0	
51	OldA	MYD	132 31 14 1982		220	0	Y
52	OldA	CMT	111 42 9 1972	Y	17	101	Y
53	OldA	CMT	111 43 3 1972	Y	17	100	Y
54	OldA	CMT	111 45 9 1972	Y	17	123	Y
55	OldA	CMT	111 45 12 1972	Y	17	99	Y
56	OldA	CMT	111 46 10 1972	Y	17	111	Y
57	OldA	MLT	M63 51 17 1983	Y	68	0	
58	OldA	MLT	M63 52 11 1983	Y	68	0	
59	OldA	MLT	M63 47 22 1982	Y	69	118	
60	OldA	MLT	M63 49 3 1982	Y	69	81	
61	OldA	MLT	M63 49 16 1982		69	112	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
62	OldA	LMT	101 61 3 1979	Y	59	84	Y
63	OldA	LMT	101 61 17 1979	Y	59	0	
64	OldA	LMT	101 59 4 1979	Y	59	73	Y
65	OldA	LMT	101 59 6 1979	Y	59	49	Y
66	OldA	LMT	101 59 13 1979	Y	59	78	Y
67	Poll	RIT	M61 5 4 1980	Y	70	0	
68	Poll	RIT	M61 6 3 1980	Y	70	0	
69	Poll	RIT	M61 8 8 1980	Y	70	0	
70	Poll	RIT	M61 9 24 1980	Y	70	0	
71	Poll	RIT	M61 11 3 1980	Y	70	0	
72	OldA	SLT	112 6 8 1972		24	0	Y
73	OldA	SLT	112 9 3 1972	Y	24	0	Y
74	OldA	SLT	112 9 6 1972	Y	24	0	Y
75	OldA	SLT	112 9 12 1972	Y	24	0	Y
76	OldA	SLT	112 9 13 1972	Y	24	0	Y
77	OldA	MYD02	132 23 3 1981	Y	221	0	
78	OldA	MYD02	132 23 4 1982	Y	220	4	
79	OldA	MYD02	132 23 5 1982	Y	220	63	Y
80	OldA	MYD02	132 23 7 1982	Y	220	65	Y
81	OldA	MYD02	132 23 8 1982	Y	220	58	
82	OldA	MYD02	092 2 27 1978		213	58	
83	OldA	MYD02	092 7 25 1978	Y	219	0	Y
84	OldA	MYD	132 29 8 1982		220	70	Y
85	OldA	MYD	132 29 10 1982		220	68	
86	OldA	MYD	132 29 13 1982	Y	220	73	
87	OldA	MYD	132 29 15 1982	Y	220	65	
88	OldA	MYD	132 29 16 1982	Y	220	70	Y
89	OldA	MYD	132 29 20 1982	Y	220	68	
90	OldA	MYD	132 29 22 1982	Y	220	68	Y
91	OldA	MYD	132 31 10 1982	Y	220	71	Y
92	OldA	MYD	132 31 11 1982	Y	220	61	
93	OldA	CRD	132 18 3 1981	Y	221	40	
94	OldA	CRD	132 18 4 1981	Y	221	2	
95	OldA	CRD	132 18 5 1981	Y	221	62	
96	OldA	CRD	132 18 6 1981	Y	221	46	
97	OldA	CRD	132 18 8 1981	Y	209	34	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
98	OldA	PB121	132 19 21 1981	Y	221	0	
99	OldA	PB121	132 20 16 1981	Y	221	56	
100	OldA	PB121	132 21 19 1981	Y	209	0	
101	OldA	PB121	132 23 15 1982	Y	220	0	
102	OldA	PB121	132 24 5 1982	Y	220	62	
103	OldA	PB111	132 6 20 1982	Y	208	0	
104	OldA	PB111	132 10 23 1981	Y	211	0	
105	OldA	PB111	132 13 15 1981	Y	218	0	
106	OldA	PB111	132 13 12 1981	Y	218	0	
107	OldA	PB111	132 25 16 1982	Y	220	0	
108	OldA	SIT	091 22 3 1969		12	131	Y
109	OldA	SIT	091 22 4 1969		0	0	
110	OldA	SIT	091 23 3 1969		12	0	
111	OldA	SIT	091 23 4 1969		12	0	Y
112	OldA	SIT	091 22 16 1969		12	0	
113	OldA	PNT01	M63 2 4 1980	Y	69	77	Y
114	OldA	PNT01	M63 3 4 1980	Y	69	81	Y
115	OldA	PNT01	M63 4 11 1980	Y	69	67	Y
116	OldA	PNT01	M63 5 12 1980	Y	69	80	Y
117	OldA	PNT02	M63 9 5 1980	Y	69	68	Y
118	OldA	PNT02	M63 9 6 1980	Y	69	65	Y
119	OldA	PNT02	M63 10 4 1980	Y	69	60	Y
120	OldA	PNT02	M63 10 6 1980	Y	69	71	Y
121	OldA	PNT02	M63 11 6 1980		69	63	Y
122	OldA	PNT02	M63 11 10 1980	Y	69	75	Y
123	OldA	CKT	M63 35 6 1982	Y	69	0	Y
124	OldA	CKT	M63 36 4 1982	Y	69	146	Y
125	OldA	CKT	M63 36 7 1982	Y	69	0	Y
126	OldA	CKT	M63 37 9 1982	Y	69	0	Y
127	OldA	CKT	M63 38 7 1982	Y	69	156	Y
128	OldA	MZT	M63 41 4 1981	Y	70	0	Y
129	OldA	MZT	M63 42 6 1981	Y	70	0	Y
130	OldA	MZT	M63 43 9 1981	Y	70	0	Y
131	OldA	MZT	M63 44 7 1981	Y	70	0	Y
132	OldA	MZT	M63 45 7 1981	Y	70	0	Y
133	OldA	MLT	M63 47 8 1981	Y	70	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
134	OldA	MZT	M63 47 3 1981	Y	70	0	
135	OldA	MLT	M63 50 2 1982	Y	69	93	Y
136	OldA	ADOT	M63 55 17 1982	Y	69	0	Y
137	OldA	ADOT	M63 56 2 1982	Y	69	0	Y
138	OldA	ADOT	M63 56 5 1982	Y	69	154	Y
139	OldA	ADOT	M63 57 7 1982	Y	69	0	
140	OldA	ADOT	M63 58 10 1982	Y	69	0	
141	OldA	KPDT	142 7 5 1982	Y	182	0	Y
142	OldA	KPDT	142 7 6 1982	Y	182	0	Y
143	OldA	KPDT	142 7 21 1982		169	0	Y
144	OldA	KPDT	142 8 2 1982	Y	182	0	Y
145	OldA	KPDT	142 8 20 1983	Y	186	0	
146	OldA	BAYT	142 13 11 1982	Y	182	95	Y
147	OldA	BAYT	142 14 14 1982	Y	182	125	Y
148	OldA	BAYT	142 15 7 1982	Y	182	132	Y
149	OldA	BAYT	142 15 15 1982	Y	181	74	Y
150	OldA	BAYT	142 13 3 1982	Y	182	149	Y
151	OldA	TAT	091 26 21 1988	Y	98	0	
152	OldA	TAT	091 26 22 1988	Y	98	65	
153	OldA	TAT	091 27 22 1988	Y	98	17	
154	OldA	TAT	091 27 23 1988	Y	98	0	Y
155	OldA	TAT	091 31 5 1988	Y	98	0	
156	OldA	RTMT	101 8 6 1970	Y	13	93	Y
157	OldA	RTMT	101 8 9 1970	Y	13	119	Y
158	OldA	RTMT	101 8 10 1970	Y	13	85	Y
159	OldA	RTMT	101 8 21 1970	Y	13	197	Y
160	OldA	RTMT	101 10 3 1970	Y	13	90	Y
161	OldA	TONT	101 5 1 1970	Y	13	227	Y
162	OldA	TONT	101 5 3 1970	Y	13	230	Y
163	OldA	TONT	101 5 12 1970	Y	13	238	Y
164	OldA	TONT	101 5 19 1970	Y	13	114	Y
165	OldA	TONT	101 5 23 1970	Y	13	226	Y
166	OldA	VTT	111 7 8 1970		12	119	Y
167	OldA	VTT	111 9 8 1970	Y	13	128	Y
168	OldA	VTT	111 10 7 1970		13	123	Y
169	OldA	VTT	111 12 4 1970	Y	13	135	Y

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
170	OldA	VTT	111 12 6 1970		13	112	Y
171	OldA	TKT	142 31 14 1984	Y	120	5	Y
172	OldA	TKT	142 31 18 1984	Y	185	28	Y
173	OldA	TKT	142 31 20 1984	Y	185	80	Y
174	OldA	TKT	142 31 22 1984	Y	185	73	Y
175	OldA	TKT	142 31 23 1984	Y	185	79	Y
176	OldA	TGT	142 33 17 1984		66	0	Y
177	OldA	TGT	142 34 13 1984	Y	183	74	Y
178	OldA	TGT	142 34 18 1984		183	43	Y
179	OldA	TGT	142 35 14 1984	Y	183	33	Y
180	OldA	TGT	142 35 19 1984	Y	183	70	Y
181	OldA	PUT	142 55 2 1984	Y	181	77	Y
182	OldA	PUT	142 55 8 1984	Y	180	39	Y
183	OldA	PUT	142 56 3 1984	Y	182	56	Y
184	OldA	PUT	142 57 7 1984	Y	182	17	Y
185	OldA	PUT	142 57 12 1984	Y	182	19	Y
186	OldA	KKT	142 28 12 1984	Y	185	34	Y
187	OldA	KKT	142 28 13 1984	Y	185	4	Y
188	OldA	KKT	142 29 3 1984	Y	185	88	Y
189	OldA	KKT	142 29 4 1984	Y	185	61	Y
190	OldA	KKT	142 29 5 1984	Y	185	55	Y
191	OldA	MVT	142 25 4 1984	Y	184	58	Y
192	OldA	MVT	142 25 6 1984	Y	184	49	Y
193	OldA	MVT	142 25 8 1984	Y	184	58	Y
194	OldA	MVT	142 25 10 1984	Y	184	48	Y
195	OldA	MVT	142 25 12 1984	Y	184	69	Y
196	OldA	GPT	142 18 3 1984	Y	184	72	Y
197	OldA	GPT	142 18 8 1984	Y	185	74	Y
198	OldA	GPT	142 19 4 1984	Y	185	91	Y
199	OldA	GPT	142 19 6 1984	Y	185	47	Y
200	OldA	GPT	142 19 12 1984	Y	185	28	Y
201	OldA	NLAD	092 18 21 1978	Y	216	62	Y
202	OldA	NLAD	092 19 5 1978	Y	216	19	Y
203	OldA	NLAD	092 19 12 1978	Y	204	8	Y
204	OldA	NLAD	092 19 28 1978	Y	216	46	Y
205	OldA	NLAD	092 20 5 1978	Y	216	65	Y

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
206	OldA	TRD	092 14 18 1978	Y	209	62	Y
207	OldA	TRD	092 14 23 1978		209	2	Y
208	OldA	TRD	092 15 21 1978	Y	208	66	Y
209	OldA	TRD	092 15 23 1978		196	47	Y
210	OldA	TRD	092 15 27 1978		208	65	Y
211	OldA	MBD	092 21 6 1979	Y	216	55	Y
212	OldA	MBD	092 21 8 1979	Y	216	64	Y
213	OldA	MBD	092 21 9 1979	Y	216	62	Y
214	OldA	MBD	092 21 11 1979	Y	216	60	Y
215	OldA	MBD	092 21 12 1979	Y	216	51	Y
216	OldA	MLT	M63 50 5 1982	Y	69	119	Y
217	OldA	KAT10	091 56 20 1969		12	0	
218	OldA	KAT10	091 56 21 1969		12	0	
219	OldA	KAT10	091 56 22 1969		12	0	
220	OldA	KAT10	091 43 23 1969		12	0	
221	OldA	KAT10	091 43 24 1969		0	0	
222	OldA	KAT07	091 44 20 1969		12	0	
223	OldA	KAT07	091 54 21 1969		12	0	
224	OldA	KAT07	091 44 22 1969		12	0	
225	OldA	KAT07	091 44 23 1969		12	0	
226	OldA	KAT07	091 44 24 1969		12	0	
227	OldA	THT	091 45 3 1969		12	0	
228	OldA	THT	091 45 21 1969		12	0	
229	OldA	THT	091 45 22 1969		4	0	
230	OldA	THT	091 45 23 1969		12	0	
231	OldA	THT	091 45 24 1969		12	0	
232	OldA	TACD	092 25 8 1980	Y	216	70	
233	OldA	TACD	092 25 10 1980	Y	204	55	
234	OldA	TACD	092 25 11 1980	Y	216	51	
235	OldA	TACD	092 25 12 1980	Y	216	71	
236	OldA	TACD	092 25 13 1980		216	53	
237	OldA	CATD	092 26 23 1980	Y	214	65	Y
238	OldA	CATD	092 27 10 1980	Y	212	81	Y
239	OldA	CATD	092 27 20 1980	Y	212	74	Y
240	OldA	PILD	092 36 8 1982	Y	200	67	Y
241	OldA	PILD	092 36 9 1982		200	66	Y

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
242	OldA	PILD	092 36 10 1982	Y	212	86	Y
243	OldA	PILD	092 36 12 1982		212	89	Y
244	OldA	PILD	092 36 18 1982	Y	212	88	Y
245	OldA	PGD	092 9 8 1978	Y	209	63	Y
246	OldA	PGD	092 9 12 1978	Y	209	55	Y
247	OldA	PGD	092 9 13 1978	Y	209	61	Y
248	OldA	PGD	092 10 19 1978	Y	209	55	Y
249	OldA	PGD	092 10 23 1978	Y	209	57	Y
250	OldA	TAGT	102 8 3 1974	Y	111	71	Y
251	OldA	TAGT	102 8 9 1974	Y	111	86	Y
252	OldA	TAGT	102 5 25 1974		111	90	Y
253	OldA	TBD	132 75 8 1985	Y	213	46	Y
254	OldA	TBD	132 75 14 1985	Y	212	59	Y
255	OldA	TBD	132 76 21 1985	Y	201	48	Y
256	OldA	TBD	132 74 22 1985	Y	213	45	Y
257	OldA	TBD	132 76 23 1985	Y	213	23	Y
258	OldA	MRD	132 13 14 1981	Y	218	74	
259	OldA	MRD	132 39 17 1982	Y	220	68	Y
260	OldA	MRD	132 39 23 1982	Y	220	80	Y
261	OldA	EGD	132 41 15 1982	Y	209	0	Y
262	OldA	EGD	132 43 15 1982	Y	221	0	Y
263	OldA	EGD	132 41 17 1982		221	0	Y
264	OldA	EGD	132 43 17 1982	Y	221	0	Y
265	OldA	EGD	132 41 19 1982		221	0	Y
266	OldA	MGD	142 46 2 1983	Y	182	60	
267	OldA	MGD	142 45 15 1983		182	59	
268	OldA	MGD	142 45 28 1983	Y	182	50	
269	OldA	CMT	111 43 4 1972	Y	17	0	
270	OldA	MZT	M63 41 13 1981	Y	70	0	
271	OldA	THT	091 54 8 1969		2	0	
272	OldA	MYD	132 31 8 1982	Y	220	67	
273	OldA	MYD	132 29 7 1982		220	74	
274	OldA	MYD	132 29 2 1982	Y	220	68	
275	OldA	CMT	111 43 5 1972	Y	17	96	
276	OldA	CMT	111 43 9 1972	Y	17	0	
277	OldA	MZT	M63 41 14 1981	Y	70	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
278	OldA	MZT	M63 41 10 1981	Y	70	0	
279	OldA	THT	091 54 9 1969		1	0	
280	OldA	THT	091 54 10 1969		0	0	
281	OldA	AROD III	092 28 16 1980		183	38	
282	OldA	AROD III	092 28 17 1980	Y	212	44	
283	OldA	AROD	092 28 18 1980	Y	132	0	
284	OldA	AROD III	092 28 19 1980		133	0	
285	OldA	AROD III	092 28 20 1980	Y	212	41	
286	OldA	AROD	092 28 21 1980		212	0	
287	OldA	AROD	092 28 22 1980	Y	212	18	
288	OldA	AROD	092 28 23 1980	Y	200	14	
289	OldA	AROD	092 28 25 1980	Y	212	26	
290	OldA	AROD	092 28 26 1980	Y	188	21	
291	OldA	AROD III	092 28 27 1980	Y	211	0	
292	OldA	AROD III	092 28 29 1980	Y	212	49	
293	OldA	AROD III	092 28 30 1980	Y	212	0	
294	OldA	VTT	111 4 1 1970	Y	13	122	
295	OldA	VTT	111 10 11 1970	Y	13	119	Y
296	OldA	VTT	111 15 2 1970	Y	13	124	Y
297	OldA	VTT	111 16 9 1970	Y	12	124	Y
298	OldA	VTT	111 16 19 1970	Y	13	103	
299	OldA	VTT	111 19 4 1970	Y	13	98	
300	OldA	VTT	111 27 19 1970	Y	12	45	Y
301	OldA	VTT	111 27 23 1970	Y	12	42	Y
302	OldA	VTT	111 28 15 1970		13	58	
303	OldA	PNP01	M63 2 8 1980	Y	69	52	Y
304	OldA	PNP01	M63 2 16 1980	Y	69	36	Y
305	OldA	PNP01	M63 3 7 1980	Y	69	73	Y
306	OldA	PNP01	M63 4 8 1980	Y	69	38	Y
307	OldA	PNT02	M63 9 8 1980	Y	69	67	Y
308	OldA	PNT02	M63 9 12 1980		69	52	Y
309	OldA	PNT02	M63 9 16 1980	Y	69	66	Y
310	OldA	PNT02	M63 9 21 1980	Y	69	28	Y
311	OldA	PNT02	M63 10 2 1980		69	31	Y
312	OldA	PNT02	M63 10 8 1980	Y	69	76	Y
313	OldA	PNT02	M63 10 11 1980	Y	69	72	Y

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
314	OldA	PNT02	M63 10 16 1980	Y	69	81	Y
315	OldA	PNT02	M63 11 4 1980		69	30	Y
316	OldA	PNT02	M63 11 8 1980		69	57	Y
317	OldA	PNT02	M63 11 12 1980	Y	69	83	Y
318	OldA	PNT02	M63 11 20 1980	Y	69	67	Y
319	OldA	PNT02	M63 12 2 1980	Y	69	48	Y
320	OldA	PNT02	M63 12 8 1980		69	82	Y
321	OldA	PNT02	M63 12 9 1980	Y	69	51	Y
322	OldA	PNT01	M63 2 18 1980	Y	69	59	Y
323	OldA	PNT01	M63 5 20 1980	Y	69	83	
324	OldA	PNT01	M63 7 3 1980	Y	69	0	
325	OldA	PNT01	M63 7 20 1980	Y	69	65	
326	OldA	PNT02	M63 12 4 1980		69	71	Y
327	OldA	PNT02	M63 14 4 1980	Y	69	85	
328	OldA	PNT02	M63 14 21 1980	Y	69	77	
329	OldA	SLT	112 2 22 1972	Y	24	0	
330	OldA	SLT	112 3 17 1972	Y	24	0	
331	OldA	SLT	112 3 24 1972		24	0	
332	OldA	SLT	112 5 8 1972	Y	24	0	
333	OldA	SLT	112 9 18 1972	Y	24	0	Y
334	OldA	SLT	112 11 7 1972	Y	24	102	
335	OldA	SLT	112 15 8 1972	Y	24	123	
336	OldA	SLT	112 15 19 1972	Y	24	0	
337	OldA	SLT	112 17 6 1972		24	0	
338	OldA	TAGT	083 11 17 1978		24	0	
339	OldA	TAGT	083 11 18 1978	Y	24	20	
340	OldA	TAGT	083 13 11 1978	Y	24	0	
341	OldA	TAGT	083 14 9 1978	Y	24	34	
342	OldA	TAGT	083 21 6 1978	Y	24	120	
343	OldA	TAGT	083 5 9 1978	Y	24	0	
344	OldA	TAGT	083 5 22 0		0	0	
345	OldA	TAGT	083 10 3 1978	Y	24	40	
346	OldA	EGD	132 14 2 1981	Y	218	69	
347	OldA	EGD	132 14 4 1981	Y	218	0	
348	OldA	EGD	132 14 9 1981		218	0	
349	OldA	EGD	132 14 14 1981	Y	218	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
350	OldA	EGD	132 14 17 1981	Y	218	0	
351	OldA	EGD	132 14 23 1981	Y	218	68	
352	OldA	EGD	132 15 2 1981	Y	218	79	
353	OldA	EGD	132 15 7 1981	Y	218	61	
354	OldA	EGD	132 15 10 1981	Y	211	0	
355	OldA	EGD	132 15 19 1981	Y	218	0	
356	G025	RIT	M51 33 1 1981		123	24	
357	G025	RIT	M51 33 2 1981		123	24	
358	G025	RIT	M51 33 3 1981	Y	123	24	
359	G025	RIT	M51 33 4 1981		123	24	
360	G025	RIT	M51 33 5 1981	Y	75	24	
361	G025	RIT	M51 33 6 1981	Y	123	24	
362	G025	RIT	M51 33 7 1981	Y	123	24	
363	G025	RIT	M51 33 8 1981	Y	123	24	
364	G025	RIT	M51 33 10 1981	Y	123	24	
365	G025	RIT	M51 33 11 1981	Y	123	24	
366	G025	RIT	M51 33 13 1981	Y	123	24	
367	G025	RIT	M51 33 14 1981		123	24	
368	G025	RIT	M51 33 15 1981	Y	123	24	
369	G025	RIT	M51 33 16 1981	Y	123	24	
370	G025	RIT	M51 33 17 1981	Y	123	24	
371	G025	RIT	M51 33 18 1981	Y	123	24	
372	G025	RIT	M51 33 19 1981	Y	123	24	
373	G025	RIT	M51 33 20 1981		123	24	
374	G025	RIT	M51 33 21 1981	Y	123	24	
375	G025	RIT	M51 33 22 1981	Y	123	24	
376	G025	RIT	M51 33 23 1981		123	24	
377	G025	RIT	M51 33 24 1981	Y	123	24	
378	G025	RIT	M51 33 25 1981	Y	123	24	
379	G025	RIT	M51 33 26 1981	Y	123	24	
380	G025	RIT	M51 34 1 1981	Y	123	24	
381	G025	RIT	M51 34 2 1981		123	24	
382	G025	RIT	M51 34 3 1981	Y	123	24	
383	G025	RIT	M51 34 4 1981		123	24	
384	G025	RIT	M51 34 6 1981		123	24	
385	G025	RIT	M51 34 7 1981	Y	123	24	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
386	G025	RIT	M51 34 8 1981		123	24	
387	G025	RIT	M51 34 9 1981	Y	123	24	
388	G025	RIT	M51 34 10 1981		123	24	
389	G025	RIT	M51 34 11 1981		123	24	
390	G025	RIT	M51 34 13 1981		123	24	
391	G025	RIT	M51 34 14 1981		123	24	
392	G025	RIT	M51 34 16 1981	Y	123	24	
393	G025	RIT	M51 34 17 1981	Y	123	24	
394	G025	RIT	M51 34 18 1981	Y	123	24	
395	G025	RIT	M51 34 19 1981		123	24	
396	G025	RIT	M51 34 20 1981	Y	123	24	
397	G025	RIT	M51 34 21 1981	Y	123	24	
398	G025	RIT	M51 34 22 1981	Y	123	24	
399	G025	RIT	M51 34 23 1981		123	24	
400	G025	RIT	M51 34 24 1981		123	24	
401	G025	RIT	M51 34 25 1981		123	24	
402	G025	RIT	M51 34 26 1981	Y	123	24	
403	G025	RIT	M51 35 1 1981	Y	123	24	
404	G025	RIT	M51 35 2 1981	Y	123	24	
405	G025	RIT	M51 35 4 1981		123	24	
406	G025	RIT	M51 35 5 1981		123	24	
407	G025	RIT	M51 35 6 1981		123	24	
408	G025	RIT	M51 35 7 1981	Y	123	24	
409	G025	RIT	M51 35 8 1981		123	24	
410	G025	RIT	M51 35 9 1981		123	24	
411	G025	RIT	M51 35 11 1981		123	24	
412	G025	RIT	M51 35 12 1981		123	24	
413	G025	RIT	M51 35 13 1981		123	24	
414	G025	RIT	M51 35 14 1981		123	24	
415	G025	RIT	M51 35 15 1981	Y	123	24	
416	G025	RIT	M51 35 16 1981	Y	123	24	
417	G025	RIT	M51 35 17 1981	Y	76	24	
418	G025	RIT	M51 35 18 1981	Y	123	24	
419	G025	RIT	M51 35 19 1981	Y	123	24	
420	G025	RIT	M51 35 20 1981	Y	123	24	
421	G025	RIT	M51 35 21 1981	Y	123	24	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
422	G025	RIT	M51 35 23 1981	Y	123	24	
423	G025	RIT	M51 35 24 1981		123	24	
424	G025	RIT	M51 35 26 1981	Y	123	24	
425	G025	RIT	M51 36 1 1981		123	24	
426	G025	RIT	M51 36 2 1981		123	24	
427	G025	RIT	M51 36 3 1981	Y	123	24	
428	G025	RIT	M51 36 4 1981	Y	123	24	
429	G025	RIT	M51 36 5 1981	Y	123	24	
430	G025	RIT	M51 36 6 1981		123	24	
431	G025	RIT	M51 36 7 1981	Y	123	24	
432	G025	RIT	M51 36 9 1981	Y	123	24	
433	G025	RIT	M51 36 11 1981		123	24	
434	G025	RIT	M51 36 12 1981		123	24	
435	G025	RIT	M51 36 13 1981	Y	123	24	
436	G025	RIT	M51 36 14 1981	Y	123	24	
437	G025	RIT	M51 36 16 1981	Y	123	24	
438	G025	RIT	M51 36 17 1981	Y	123	24	
439	G025	RIT	M51 36 18 1981	Y	123	24	
440	G025	RIT	M51 36 19 1981	Y	123	24	
441	G025	RIT	M51 36 20 1981	Y	123	24	
442	G025	RIT	M51 36 21 1981	Y	123	24	
443	G025	RIT	M51 36 22 1981	Y	123	24	
444	G025	RIT	M51 36 23 1981	Y	123	24	
445	G025	RIT	M51 36 24 1981	Y	123	24	
446	G025	RIT	M51 36 26 1981	Y	123	24	
447	OldA	THD	092 2 7 1978	Y	215	46	
448	OldA	THD	092 2 8 1978	Y	214	62	
449	OldA	THD	092 3 9 1978	Y	215	0	
450	OldA	THD	092 3 14 1978	Y	215	80	
451	OldA	THD	092 4 7 1978	Y	215	54	
452	OldA	THD	092 4 14 1978	Y	215	50	Y
453	OldA	THD	092 5 16 1978	Y	215	58	
454	OldA	THD	092 5 20 1978	Y	215	0	
455	OldA	THD	092 6 10 1978		215	65	
456	OldA	THD	092 6 22 1978	Y	215	74	
457	RejA	TAT	062 1 6 2009		0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
458	RejA	TAT	062 1 10 2009		0	0	
459	RejA	TAT	062 2 7 2009		0	0	
460	RejA	TAT	062 2 8 2009		0	0	
461	RejA	TAT	062 2 9 2009		0	0	
462	RejA	TAT	062 4 6 2009	Y	0	0	
463	RejA	TAT	062 5 8 2009		0	0	
464	RejA	TAT	062 11 25 2009		0	0	
465	RejA	TAT	062 12 21 2009	Y	0	0	
466	RejA	TAT	062 12 23 2009	Y	0	0	
467	RejA	TAT	062 12 25 2009		0	0	
468	RejA	TAT	062 13 21 2009	Y	0	0	
469	RejA	TAT	062 13 23 2009	Y	0	0	
470	RejA	TAT	062 13 25 2009	Y	0	0	
471	RejA	TAT	062 14 22 2009	Y	0	0	
472	RejA	TAT	062 14 24 2009		0	0	
473	RejA	TAT	062 14 25 2009		0	0	
474	RejA	TAT	062 15 21 2009	Y	0	0	
475	RejA	TAT	062 15 22 2009	Y	0	0	
476	RejA	TAT	062 15 23 2009	Y	0	0	
477	RejA	TAT	062 15 25 2009	Y	0	0	
478	RejA	TAT	062 26 11 2009	Y	0	0	
479	RejA	TAT	062 26 12 2009	Y	0	0	
480	RejA	TAT	062 26 15 2009	Y	0	0	
481	RejA	TAT	062 27 11 2009	Y	0	0	
482	RejA	TAT	062 27 12 2009	Y	0	0	
483	RejA	TAT	062 27 13 2009		0	0	
484	RejA	TAT	062 28 12 2009	Y	0	0	
485	RejA	TAT	062 28 13 2009	Y	0	0	
486	RejA	TAT	062 29 14 2009	Y	0	0	
487	RejA	TAT	062 30 11 2009	Y	0	0	
488	RejA	TAT	062 30 12 2009	Y	0	0	
489	RejA	TAT	062 30 14 2009		0	0	
490	RejA	TAT	062 36 17 2009	Y	0	0	
491	RejA	TAT	062 36 20 2009	Y	0	0	
492	RejA	TAT	062 37 16 2009	Y	0	0	
493	RejA	TAT	062 37 17 2009		0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
494	RejA	TAT	062 37 20 2009		0	0	
495	RejA	TAT	062 38 19 2009	Y	0	0	
496	RejA	TAT	062 40 16 2009		0	0	
497	RejA	TAT	062 40 17 2009		0	0	
498	RejA	TAT	062 40 18 2009	Y	0	0	
499	RejA	TAT	062 40 19 2009		0	0	
500	RejA	TAT	062 40 20 2009	Y	0	0	
501	RejA	TAT	062 41 4 2009		0	0	
502	RejA	TAT	062 43 5 2009		0	0	
503	RejA	TAT	062 44 3 2009		0	0	
504	RejA	TAT	062 45 1 2009	Y	0	0	
505	RejA	TAT	062 56 16 2009		0	0	
506	RejA	TAT	062 56 18 2009	Y	0	0	
507	RejA	TAT	062 57 18 2009	Y	0	0	
508	RejA	TAT	062 58 16 2009	Y	0	0	
509	RejA	TAT	062 58 18 2009	Y	0	0	
510	RejA	TAT	062 58 19 2009		0	0	
511	RejA	TAT	062 59 17 2009		0	0	
512	RejA	TAT	062 59 19 2009		0	0	
513	RejA	TAT	062 60 17 2009	Y	0	0	
514	RejA	TAT	062 60 20 2009	Y	0	0	
515	RejA	MZT	072 6 13 2009	Y	0	0	
516	RejA	MZT	072 8 13 2009	Y	0	0	
517	RejA	MZT	072 16 16 2009	Y	0	0	
518	RejA	MZT	072 17 16 2009	Y	0	0	
519	RejA	MZT	072 18 16 2009	Y	0	0	
520	RejA	MZT	072 18 17 2009	Y	0	0	
521	RejA	MZT	072 18 18 2009	Y	0	0	
522	RejA	MZT	072 19 16 2009		0	0	
523	RejA	MZT	072 19 18 2009	Y	0	0	
524	RejA	MZT	072 19 19 2009	Y	0	0	
525	RejA	MZT	072 19 20 2009		0	0	
526	RejA	MZT	072 20 16 2009		0	0	
527	RejA	MZT	072 20 18 2009	Y	0	0	
528	RejA	MZT	072 20 20 2009	Y	0	0	
529	RejA	MZT	072 26 18 2009	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
530	RejA	MZT	072 27 16 2009	Y	0	0	
531	RejA	MZT	072 27 18 2009		0	0	
532	RejA	MZT	072 28 17 2009	Y	0	0	
533	RejA	MZT	072 28 18 2009	Y	0	0	
534	RejA	MZT	072 28 19 2009	Y	0	0	
535	RejA	MZT	072 28 20 2009	Y	0	0	
536	RejA	MZT	072 29 16 2009		0	0	
537	RejA	MZT	072 30 16 2009	Y	0	0	
538	RejA	MZT	072 30 17 2009		0	0	
539	RejA	MZT	072 30 19 2009	Y	0	0	
540	RejA	MZT	072 31 16 2009	Y	0	0	
541	RejA	MZT	072 31 18 2009	Y	0	0	
542	RejA	MZT	072 31 19 2009	Y	0	0	
543	RejA	MZT	072 31 20 2009	Y	0	0	
544	RejA	MZT	072 32 19 2009	Y	0	0	
545	RejA	MZT	072 33 16 2009	Y	0	0	
546	RejA	MZT	072 33 18 2009		0	0	
547	RejA	MZT	072 33 19 2009	Y	0	0	
548	RejA	MZT	072 35 16 2009	Y	0	0	
549	RejA	MZT	072 35 17 2009	Y	0	0	
550	RejA	MZT	072 35 18 2009	Y	0	0	
551	RejA	MZT	072 35 19 2009		0	0	
552	RejA	MZT	072 35 20 2009	Y	0	0	
553	RejA	MZT	072 46 1 2009	Y	0	0	
554	RejA	MZT	072 46 2 2009	Y	0	0	
555	RejA	MZT	072 46 3 2009	Y	0	0	
556	RejA	MZT	072 46 5 2009	Y	0	0	
557	RejA	MZT	072 47 2 2009	Y	0	0	
558	RejA	MZT	072 47 3 2009	Y	0	0	
559	RejA	MZT	072 47 4 2009		0	0	
560	RejA	MZT	072 47 5 2009	Y	0	0	
561	RejA	MZT	072 48 4 2009	Y	0	0	
562	RejA	MZT	072 49 3 2009	Y	0	0	
563	RejA	MZT	072 49 4 2009	Y	0	0	
564	RejA	MZT	072 49 5 2009	Y	0	0	
565	RejA	MZT	072 50 1 2009	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
566	RejA	MZT	072 50 2 2009	Y	0	0	
567	RejA	MZT	072 50 3 2009	Y	0	0	
568	RejA	MZT	072 50 4 2009	Y	0	0	
569	RejA	MZT	072 50 5 2009	Y	0	0	
570	RejA	MZT	072 51 15 2009		0	0	
571	RejA	MZT	072 52 11 2009	Y	0	0	
572	RejA	MZT	072 52 14 2009	Y	0	0	
573	RejA	MZT	072 53 11 2009	Y	0	0	
574	RejA	MZT	072 54 12 2009	Y	0	0	
575	RejA	MZT	072 55 11 2009		0	0	
576	RejA	GPT	063 7 3 2007	Y	0	0	
577	RejA	GPT	063 7 4 2007	Y	0	0	
578	RejA	GPT	063 7 8 2007	Y	0	0	
579	RejA	GPT	063 7 9 2007	Y	0	0	
580	RejA	GPT	063 7 13 2007	Y	0	0	
581	RejA	GPT	063 7 15 2007	Y	0	0	
582	RejA	GPT	063 7 16 2007	Y	0	0	
583	RejA	GPT	063 7 17 2007	Y	0	0	
584	RejA	GPT	063 7 18 2007	Y	0	0	
585	RejA	GPT	063 7 19 2007	Y	0	0	
586	RejA	GPT	063 7 20 2007	Y	0	0	
587	RejA	GPT	063 7 21 2007	Y	0	0	
588	RejA	GPT	063 7 22 2007	Y	0	0	
589	RejA	GPT	063 7 23 2007	Y	0	0	
590	RejA	GPT	063 7 24 2007	Y	0	0	
591	RejA	GPT	063 7 25 2007	Y	0	0	
592	RejA	GPT	063 8 1 2007	Y	0	0	
593	RejA	GPT	063 8 4 2007	Y	0	0	
594	RejA	GPT	063 8 5 2007	Y	0	0	
595	RejA	GPT	063 8 6 2007	Y	0	0	
596	RejA	GPT	063 8 7 2007		0	0	
597	RejA	GPT	063 8 9 2007	Y	0	0	
598	RejA	GPT	063 8 10 2007	Y	0	0	
599	RejA	GPT	063 8 14 2007		0	0	
600	RejA	GPT	063 8 19 2007	Y	0	0	
601	RejA	GPT	063 8 20 2007	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
602	RejA	GPT	063 8 21 2007	Y	0	0	
603	RejA	GPT	063 8 24 2007	Y	0	0	
604	RejA	GPT	063 9 1 2007	Y	0	0	
605	RejA	GPT	063 9 7 2007		0	0	
606	RejA	GPT	063 9 13 2007	Y	0	0	
607	RejA	GPT	063 9 14 2007	Y	0	0	
608	RejA	GPT	063 9 17 2007	Y	0	0	
609	RejA	GPT	063 9 19 2007	Y	0	0	
610	RejA	GPT	063 9 21 2007	Y	0	0	
611	RejA	GPT	063 9 23 2007	Y	0	0	
612	RejA	GPT	063 10 4 2007	Y	0	0	
613	RejA	GPT	063 10 5 2007	Y	0	0	
614	RejA	GPT	063 10 6 2007		0	0	
615	RejA	GPT	063 10 7 2007	Y	0	0	
616	RejA	GPT	063 10 9 2007	Y	0	0	
617	RejA	GPT	063 10 10 2007		0	0	
618	RejA	GPT	063 10 12 2007	Y	0	0	
619	RejA	GPT	063 10 16 2007	Y	0	0	
620	RejA	GPT	063 10 17 2007	Y	0	0	
621	RejA	GPT	063 10 22 2007	Y	0	0	
622	RejA	GPT	063 10 23 2007	Y	0	0	
623	RejA	GPT	063 11 6 2007	Y	0	0	
624	RejA	GPT	063 11 7 2007	Y	0	0	
625	RejA	GPT	063 11 9 2007		0	0	
626	RejA	GPT	063 11 11 2007		0	0	
627	RejA	GPT	063 11 13 2007	Y	0	0	
628	RejA	GPT	063 11 15 2007	Y	0	0	
629	RejA	GPT	063 11 16 2007	Y	0	0	
630	RejA	GPT	063 11 21 2007	Y	0	0	
631	RejA	GPT	063 11 22 2007	Y	0	0	
632	RejA	GPT	063 11 24 2007	Y	0	0	
633	RejA	GPT	063 12 1 2007	Y	0	0	
634	RejA	GPT	063 12 4 2007	Y	0	0	
635	RejA	GPT	063 12 18 2007		0	0	
636	RejA	GPT	063 12 19 2007		0	0	
637	RejA	GPT	063 12 20 2007		0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
638	RejA	GPT	063 12 22 2007		0	0	
639	RejA	GPT	063 12 25 2007		0	0	
640	RejA	GPT	063 38 14 2007	Y	0	0	
641	RejA	GPT	063 38 20 2007	Y	0	0	
642	RejA	GPT	063 39 9 2007		0	0	
643	RejA	GPT	063 39 12 2007		0	0	
644	RejA	GPT	063 39 21 2007	Y	0	0	
645	RejA	GPT	063 40 7 2007		0	0	
646	RejA	GPT	063 40 13 2007		0	0	
647	OldA	TAT	091 25 21 1988	Y	98	0	
648	OldA	TAT	091 28 19 1988	Y	98	0	
649	OldA	TAT	091 29 1 1988	Y	98	0	
650	OldA	TAT	091 29 2 1988	Y	98	0	
651	OldA	TAT	091 31 1 1988	Y	98	0	
652	OldA	TAT	091 31 4 1988	Y	98	26	
653	OldA	TAT	091 37 14 1988		0	0	
654	OldA	TAT	091 37 19 1988		0	0	
655	OldA	TAT	091 38 17 1988		0	0	
656	OldA	TAT	091 39 17 1988		0	0	
657	OldA	TAT	091 46 12 1988		0	0	
658	OldA	TAT	091 47 8 1988		0	0	
659	OldA	TAT	091 47 9 1988		0	0	
660	OldA	TAT	091 48 9 1988		0	0	
661	OldA	TAT	091 48 10 1988		0	0	
662	OldA	TAT	091 48 12 1988		0	0	
663	OldA	TAT	091 54 6 1988		0	0	
664	OldA	TAT	091 55 4 1988		0	0	
665	OldA	TAT	091 60 24 1988		0	0	
666	OldA	GNG4	142 18 1 1984	Y	185	0	
667	OldA	GNG4	142 18 2 1984	Y	185	0	
668	OldA	GNG4	142 18 7 1984	Y	185	0	
669	OldA	GNG4	142 18 10 1984	Y	185	0	
670	OldA	GNG4	142 18 20 1984	Y	185	0	
671	OldA	GNG4	142 19 10 1984	Y	185	43	
672	OldA	GNG4	142 19 11 1984	Y	185	0	
673	OldA	GNG4	142 19 13 1984	Y	185	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
674	OldA	GNG4	142 20 1 1984	Y	185	113	
675	OldA	GNG4	142 20 9 1984	Y	185	0	
676	OldA	GNG4	142 22 20 1984	Y	185	0	
677	OldA	GNG4	142 23 1 1984	Y	185	76	
678	OldA	GNG4	142 23 2 1984	Y	185	0	
679	OldA	GNG4	142 23 4 1984	Y	185	0	
680	OldA	GNG4	142 23 5 1984	Y	185	56	Y
681	OldA	GNG4	142 23 16 1984	Y	185	0	
682	OldA	GMZ	M63 41 1 1981	Y	70	0	
683	OldA	GMZ	M63 41 2 1981	Y	70	0	
684	OldA	GMZ	M63 41 15 1981	Y	70	0	Y
685	OldA	GMZ	M63 41 24 1981	Y	70	0	
686	OldA	GMZ	M63 42 1 1981	Y	70	0	
687	OldA	GMZ	M63 42 3 1981	Y	70	40	
688	OldA	GMZ	M63 42 4 1981	Y	70	118	
689	OldA	GMZ	M63 42 10 1981	Y	70	137	Y
690	OldA	GMZ	M63 43 1 1981	Y	70	0	
691	OldA	GMZ	M63 44 17 1981	Y	70	0	
692	OldA	GMZ	M63 44 19 1981	Y	70	83	
693	G122	BC1	122 5 6 2016	Y	0	0	
694	G122	BC1	122 5 7 2016	Y	0	0	
695	G122	BC1	122 5 8 2016	Y	0	0	
696	G122	BC1	122 5 9 2016	Y	0	0	
697	G122	BC1	122 5 10 2016	Y	0	0	
698	G122	BC1	122 5 11 2016	Y	0	0	
699	G122	BC1	122 5 12 2016	Y	0	0	
700	G122	BC1	122 5 13 2016	Y	0	0	
701	G122	BC1	122 5 14 2016	Y	0	0	
702	G122	BC1	122 5 15 2016	Y	0	0	
703	G122	BC1	122 5 16 2016	Y	0	0	
704	G122	BC1	122 5 17 2016	Y	0	0	
705	G122	BC1	122 5 18 2016	Y	0	0	
706	G122	BC1	122 5 19 2016	Y	0	0	
707	G122	BC1	122 5 20 2016	Y	0	0	
708	G122	BC1	122 5 21 2016	Y	0	0	
709	G122	BC1	122 6 6 2016	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
710	G122	BC1	122 6 7 2016	Y	0	0	
711	G122	BC1	122 6 8 2016	Y	0	0	
712	G122	BC1	122 6 9 2016	Y	0	0	
713	G122	BC1	122 6 10 2016	Y	0	0	
714	G122	BC1	122 6 11 2016	Y	0	0	
715	G122	BC1	122 6 12 2016	Y	0	0	
716	G122	BC1	122 6 13 2016	Y	0	0	
717	G122	BC1	122 6 14 2016	Y	0	0	
718	G122	BC1	122 6 15 2016	Y	0	0	
719	G122	BC1	122 6 16 2016	Y	0	0	
720	G122	BC1	122 6 17 2016	Y	0	0	
721	G122	BC1	122 6 18 2016	Y	0	0	
722	G122	BC1	122 6 19 2016	Y	0	0	
723	G122	BC1	122 6 20 2016	Y	0	0	
724	G122	BC1	122 7 6 2016	Y	0	0	
725	G122	BC1	122 7 7 2016	Y	0	0	
726	G122	BC1	122 7 8 2016	Y	0	0	
727	G122	BC1	122 7 9 2016	Y	0	0	
728	G122	BC1	122 7 10 2016	Y	0	0	
729	G122	BC1	122 7 11 2016	Y	0	0	
730	G122	BC1	122 7 12 2016	Y	0	0	
731	G122	BC1	122 7 13 2016	Y	0	0	
732	G122	BC1	122 7 14 2016	Y	0	0	
733	G122	BC1	122 7 15 2016	Y	0	0	
734	G122	BC1	122 7 16 2016	Y	0	0	
735	G122	BC1	122 7 17 2016	Y	0	0	
736	G122	BC1	122 7 18 2016	Y	0	0	
737	G122	BC1	122 7 19 2016	Y	0	0	
738	G122	BC1	122 7 20 2016	Y	0	0	
739	G122	BC1	122 8 6 2016	Y	0	0	
740	G122	BC1	122 8 7 2016	Y	0	0	
741	G122	BC1	122 8 8 2016	Y	0	0	
742	G122	BC1	122 8 9 2016	Y	0	0	
743	G122	BC1	122 8 10 2016	Y	0	0	
744	G122	BC1	122 8 11 2016	Y	0	0	
745	G122	BC1	122 8 12 2016	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
746	G122	BC1	122 8 13 2016	Y	0	0	
747	G122	BC1	122 8 14 2016	Y	0	0	
748	G122	BC1	122 8 15 2016	Y	0	0	
749	G122	BC1	122 8 16 2016	Y	0	0	
750	G122	BC1	122 8 17 2016	Y	0	0	
751	G122	BC1	122 8 18 2016	Y	0	0	
752	G122	BC1	122 8 19 2016	Y	0	0	
753	G122	BC1	122 8 20 2016	Y	0	0	
754	G122	BC1	122 8 21 2016	Y	0	0	
755	G122	BC1	122 9 6 2016	Y	0	0	
756	G122	BC1	122 9 7 2016	Y	0	0	
757	G122	BC1	122 9 8 2016	Y	0	0	
758	G122	BC1	122 9 9 2016	Y	0	0	
759	G122	BC1	122 9 10 2016	Y	0	0	
760	G122	BC1	122 9 11 2016	Y	0	0	
761	G122	BC1	122 9 12 2016	Y	0	0	
762	G122	BC1	122 9 13 2016	Y	0	0	
763	G122	BC1	122 9 14 2016	Y	0	0	
764	G122	BC1	122 9 15 2016	Y	0	0	
765	G122	BC1	122 9 16 2016	Y	0	0	
766	G122	BC1	122 9 17 2016	Y	0	0	
767	G122	BC1	122 9 18 2016	Y	0	0	
768	G122	BC1	122 9 19 2016	Y	0	0	
769	G122	BC1	122 9 20 2016	Y	0	0	
770	G122	BC1	122 10 6 2016	Y	0	0	
771	G122	BC1	122 10 7 2016	Y	0	0	
772	G122	BC1	122 10 8 2016	Y	0	0	
773	G122	BC1	122 10 9 2016	Y	0	0	
774	G122	BC1	122 10 10 2016	Y	0	0	
775	G122	BC1	122 10 11 2016	Y	0	0	
776	G122	BC1	122 10 12 2016	Y	0	0	
777	G122	BC1	122 10 13 2016	Y	0	0	
778	G122	BC1	122 10 14 2016	Y	0	0	
779	G122	BC1	122 10 15 2016	Y	0	0	
780	G122	BC1	122 10 16 2016	Y	0	0	
781	G122	BC1	122 10 17 2016	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
782	G122	BC1	122 10 18 2016	Y	0	0	
783	G122	BC1	122 10 19 2016	Y	0	0	
784	G122	BC1	122 10 20 2016	Y	0	0	
785	G122	BC1	122 10 21 2016	Y	0	0	
786	G122	BC1	122 11 6 2016	Y	0	0	
787	G122	BC1	122 11 7 2016	Y	0	0	
788	G122	BC1	122 11 8 2016	Y	0	0	
789	G122	BC1	122 11 9 2016	Y	0	0	
790	G122	BC1	122 11 10 2016	Y	0	0	
791	G122	BC1	122 11 11 2016	Y	0	0	
792	G122	BC1	122 11 12 2016	Y	0	0	
793	G122	BC1	122 11 13 2016	Y	0	0	
794	G122	BC1	122 11 14 2016	Y	0	0	
795	G122	BC1	122 11 15 2016	Y	0	0	
796	G122	BC1	122 11 16 2016	Y	0	0	
797	G122	BC1	122 11 17 2016	Y	0	0	
798	G122	BC1	122 11 18 2016	Y	0	0	
799	G122	BC1	122 11 20 2016	Y	0	0	
800	G122	BC1	122 12 6 2016	Y	0	0	
801	G122	BC1	122 12 7 2016	Y	0	0	
802	G122	BC1	122 12 8 2016	Y	0	0	
803	G122	BC1	122 12 9 2016	Y	0	0	
804	G122	BC1	122 12 10 2016	Y	0	0	
805	G122	BC1	122 12 11 2016	Y	0	0	
806	G122	BC1	122 12 12 2016	Y	0	0	
807	G122	BC1	122 12 13 2016	Y	0	0	
808	G122	BC1	122 12 14 2016	Y	0	0	
809	G122	BC1	122 12 15 2016	Y	0	0	
810	G122	BC1	122 12 16 2016	Y	0	0	
811	G122	BC1	122 12 17 2016	Y	0	0	
812	G122	BC1	122 12 18 2016	Y	0	0	
813	G122	BC1	122 12 20 2016	Y	0	0	
814	G122	BC1	122 12 21 2016	Y	0	0	
815	G122	BC1	122 13 6 2016	Y	0	0	
816	G122	BC1	122 13 7 2016	Y	0	0	
817	G122	BC1	122 13 8 2016	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
818	G122	BC1	122 13 9 2016	Y	0	0	
819	G122	BC1	122 13 10 2016	Y	0	0	
820	G122	BC1	122 13 11 2016	Y	0	0	
821	G122	BC1	122 13 12 2016	Y	0	0	
822	G122	BC1	122 13 13 2016	Y	0	0	
823	G122	BC1	122 13 14 2016	Y	0	0	
824	G122	BC1	122 13 15 2016	Y	0	0	
825	G122	BC1	122 13 16 2016	Y	0	0	
826	G122	BC1	122 13 17 2016	Y	0	0	
827	G122	BC1	122 13 18 2016	Y	0	0	
828	G122	BC1	122 13 19 2016	Y	0	0	
829	G122	BC1	122 13 20 2016	Y	0	0	
830	G122	BC1	122 14 6 2016	Y	0	0	
831	G122	BC1	122 14 7 2016	Y	0	0	
832	G122	BC1	122 14 8 2016	Y	0	0	
833	G122	BC1	122 14 9 2016	Y	0	0	
834	G122	BC1	122 14 10 2016	Y	0	0	
835	G122	BC1	122 14 11 2016	Y	0	0	
836	G122	BC1	122 14 12 2016	Y	0	0	
837	G122	BC1	122 14 13 2016	Y	0	0	
838	G122	BC1	122 14 14 2016	Y	0	0	
839	G122	BC1	122 14 15 2016	Y	0	0	
840	G122	BC1	122 14 16 2016	Y	0	0	
841	G122	BC1	122 14 17 2016	Y	0	0	
842	G122	BC1	122 14 18 2016	Y	0	0	
843	G122	BC1	122 14 19 2016	Y	0	0	
844	G122	BC1	122 14 20 2016	Y	0	0	
845	G122	BC1	122 14 21 2016	Y	0	0	
846	G122	BC1	122 15 6 2016	Y	0	0	
847	G122	BC1	122 15 7 2016	Y	0	0	
848	G122	BC1	122 15 8 2016	Y	0	0	
849	G122	BC1	122 15 9 2016	Y	0	0	
850	G122	BC1	122 15 10 2016	Y	0	0	
851	G122	BC1	122 15 11 2016	Y	0	0	
852	G122	BC1	122 15 12 2016	Y	0	0	
853	G122	BC1	122 15 13 2016	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
854	G122	BC1	122 15 14 2016	Y	0	0	
855	G122	BC1	122 15 15 2016	Y	0	0	
856	G122	BC1	122 15 16 2016	Y	0	0	
857	G122	BC1	122 15 17 2016	Y	0	0	
858	G122	BC1	122 15 18 2016	Y	0	0	
859	G122	BC1	122 15 19 2016	Y	0	0	
860	G122	BC1	122 15 20 2016	Y	0	0	
861	G122	BC1	122 16 11 2016	Y	0	0	
862	G122	BC1	122 16 12 2016	Y	0	0	
863	G122	BC1	122 16 13 2016	Y	0	0	
864	G122	BC1	122 16 14 2016	Y	0	0	
865	G122	BC1	122 16 15 2016	Y	0	0	
866	G122	BC1	122 16 16 2016	Y	0	0	
867	G122	BC1	122 16 17 2016	Y	0	0	
868	G122	BC1	122 16 18 2016	Y	0	0	
869	G122	BC1	122 16 20 2016	Y	0	0	
870	G122	BC1	122 16 21 2016	Y	0	0	
871	G122	BC1	122 17 6 2016	Y	0	0	
872	G122	BC1	122 17 7 2016	Y	0	0	
873	G122	BC1	122 17 8 2016	Y	0	0	
874	G122	BC1	122 17 9 2016	Y	0	0	
875	G122	BC1	122 17 10 2016	Y	0	0	
876	G122	BC1	122 17 11 2016	Y	0	0	
877	G122	BC1	122 17 12 2016	Y	0	0	
878	G122	BC1	122 17 13 2016	Y	0	0	
879	G122	BC1	122 17 14 2016	Y	0	0	
880	G122	BC1	122 17 15 2016	Y	0	0	
881	G122	BC1	122 17 16 2016	Y	0	0	
882	G122	BC1	122 17 17 2016	Y	0	0	
883	G122	BC1	122 17 18 2016	Y	0	0	
884	G122	BC1	122 17 19 2016	Y	0	0	
885	G122	BC1	122 17 20 2016	Y	0	0	
886	G122	BC1	122 18 6 2016	Y	0	0	
887	G122	BC1	122 18 7 2016	Y	0	0	
888	G122	BC1	122 18 8 2016	Y	0	0	
889	G122	BC1	122 18 9 2016	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
890	G122	BC1	122 18 10 2016	Y	0	0	
891	G122	BC1	122 18 11 2016	Y	0	0	
892	G122	BC1	122 18 12 2016	Y	0	0	
893	G122	BC1	122 18 13 2016	Y	0	0	
894	G122	BC1	122 18 14 2016	Y	0	0	
895	G122	BC1	122 18 15 2016	Y	0	0	
896	G122	BC1	122 18 16 2016	Y	0	0	
897	G122	BC1	122 18 17 2016	Y	0	0	
898	G122	BC1	122 18 18 2016	Y	0	0	
899	G122	BC1	122 18 19 2016	Y	0	0	
900	G122	BC1	122 18 20 2016	Y	0	0	
901	G122	BC1	122 18 21 2016	Y	0	0	
902	G122	BC1	122 19 6 2016	Y	0	0	
903	G122	BC1	122 19 7 2016	Y	0	0	
904	G122	BC1	122 19 8 2016	Y	0	0	
905	G122	BC1	122 19 9 2016	Y	0	0	
906	G122	BC1	122 19 10 2016	Y	0	0	
907	G122	BC1	122 19 11 2016	Y	0	0	
908	G122	BC1	122 19 12 2016	Y	0	0	
909	G122	BC1	122 19 13 2016	Y	0	0	
910	G122	BC1	122 19 14 2016	Y	0	0	
911	G122	BC1	122 19 15 2016	Y	0	0	
912	G122	BC1	122 19 16 2016	Y	0	0	
913	G122	BC1	122 19 17 2016	Y	0	0	
914	G122	BC1	122 19 18 2016	Y	0	0	
915	G122	BC1	122 19 19 2016	Y	0	0	
916	G122	BC1	122 19 20 2016	Y	0	0	
917	G122	BC1	122 20 6 2016	Y	0	0	
918	G122	BC1	122 20 7 2016	Y	0	0	
919	G122	BC1	122 20 8 2016	Y	0	0	
920	G122	BC1	122 20 9 2016	Y	0	0	
921	G122	BC1	122 20 10 2016	Y	0	0	
922	G122	BC1	122 20 11 2016	Y	0	0	
923	G122	BC1	122 20 12 2016	Y	0	0	
924	G122	BC1	122 20 13 2016	Y	0	0	
925	G122	BC1	122 20 14 2016	Y	0	0	

Nb	Type	Cultivar abbreviation	Plot, row, tree, planting year	Alive	Bunch	Fruits	Stem
926	G122	BC1	122 20 15 2016	Y	0	0	
927	G122	BC1	122 20 16 2016	Y	0	0	
928	G122	BC1	122 20 17 2016	Y	0	0	

C. Genealogy of palms sampled during the regeneration project.

Table 6. List of the 48 parent palms from 3 old accessions sampled for DNA analysis[4]

GMZ: Mozambique Tall; GNG4: Gazelle Peninsula Tall; GPY1: Tahiti Tall

Cultivar code	Parent Number	Localization (field, row, tree on the row)
GMZ	P11819	M63 41 1
GMZ	P11820	M63 41 4
GMZ	P11823	M63 41 10
GMZ	P11824	M63 41 15
GMZ	P11826	M63 42 1
GMZ	P11827	M63 42 3
GMZ	P11828	M63 42 4
GMZ	P11831	M63 42 10
GMZ	P11832	M63 43 1
GMZ	P14037	M63 41 2
GMZ	P14041	M63 41 24
GMZ	P14072	M63 44 17
GMZ	P14073	M63 44 19
GNG4	P11494	142 18 1
GNG4	P11495	142 18 2
GNG4	P11497	142 18 7
GNG4	P11498	142 18 10
GNG4	P11502	142 19 10
GNG4	P11503	142 19 11
GNG4	P11504	142 19 13
GNG4	P11509	142 20 1
GNG4	P11512	142 20 9
GNG4	P11533	142 22 20
GNG4	P11538	142 23 1
GNG4	P11539	142 23 2
GNG4	P11540	142 23 4
GNG4	P11541	142 23 5
GNG4	P11542	142 23 16
GNG4	P12403	142 18 20

[4] The visual FoxPro file is genitot.dbf

GPY1	P13168	091 25 21
GPY1	P13185	091 28 19
GPY1	P13191	091 29 1
GPY1	P13192	091 29 2
GPY1	P13204	091 31 1
GPY1	P13207	091 31 4
GPY1	P13217	091 37 14
GPY1	P13222	091 37 19
GPY1	P13227	091 38 17
GPY1	P13231	091 39 17
GPY1	P13250	091 46 12
GPY1	P13251	091 47 8
GPY1	P13252	091 47 9
GPY1	P13259	091 48 9
GPY1	P13260	091 48 10
GPY1	P13262	091 48 12
GPY1	P13272	091 54 6
GPY1	P13275	091 55 4
GPY1	P13296	091 60 24

Table 7: list of the 190 progeny palms from 3 cultivars sampled for DNA analysis[5] and genealogy checking.

Cultivar code	Field localization Plot, Row, Tree	Number of Controlled Pollination	Female parent		Male parent	
			Parent Number	Plot, Row, Tree	Parent Number	Plot, Row, Tree
GMZ	072 6 13	AN4780	P11824 GMZ	M63 41 15	P11823 GMZ	M63 41 10
GMZ	072 8 13	AN4433	P11823 GMZ	M63 41 10	P11819 GMZ	M63 41 1
GMZ	072 16 16	AN5168	P14073 GMZ	M63 44 19	P11824 GMZ	M63 41 15
GMZ	072 17 16	AN5131	P11828 GMZ	M63 42 4	P11819 GMZ	M63 41 1
GMZ	072 18 16	AN5168	P14073 GMZ	M63 44 19	P11824 GMZ	M63 41 15
GMZ	072 18 17	AN5131	P11828 GMZ	M63 42 4	P11819 GMZ	M63 41 1
GMZ	072 18 18	AN4818	P11826 GMZ	M63 42 1	P14072 GMZ	M63 44 17
GMZ	072 19 16	AN5599	P11826 GMZ	M63 42 1	P14041 GMZ	M63 41 24
GMZ	072 19 18	AN4028	P14041 GMZ	M63 41 24	P11826 GMZ	M63 42 1
GMZ	072 19 19	AN4028	P14041 GMZ	M63 41 24	P11826 GMZ	M63 42 1
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GMZ	072 20 16	AN4028	P14041 GMZ	M63 41 24	P11826 GMZ	M63 42 1
GMZ	072 20 18	AN5599	P11826 GMZ	M63 42 1	P14041 GMZ	M63 41 24
GMZ	072 20 20	AN4818	P11826 GMZ	M63 42 1	P14072 GMZ	M63 44 17
GMZ	072 26 18	AN4779	P14037 GMZ	M63 41 2	P11819 GMZ	M63 41 1
GMZ	072 27 16	AN4779	P14037 GMZ	M63 41 2	P11819 GMZ	M63 41 1
GMZ	072 27 18	AN4779	P14037 GMZ	M63 41 2	P11819 GMZ	M63 41 1
GMZ	072 28 17	AN5599	P11826 GMZ	M63 42 1	P14041 GMZ	M63 41 24
GMZ	072 28 18	AN4779	P14037 GMZ	M63 41 2	P11819 GMZ	M63 41 1
GMZ	072 28 19	AN4779	P14037 GMZ	M63 41 2	P11819 GMZ	M63 41 1
GMZ	072 28 20	AN4028	P14041 GMZ	M63 41 24	P11826 GMZ	M63 42 1
GMZ	072 29 16	AN4818	P11826 GMZ	M63 42 1	P14072 GMZ	M63 44 17
GMZ	072 30 16	AN5599	P11826 GMZ	M63 42 1	P14041 GMZ	M63 41 24
GMZ	072 30 17	AN5599	P11826 GMZ	M63 42 1	P14041 GMZ	M63 41 24
GMZ	072 30 19	AN5214	P14037 GMZ	M63 41 2	P11820 GMZ	M63 41 4
GMZ	072 31 16	AN5818	P14041 GMZ	M63 41 24	P11832 GMZ	M63 43 1
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GMZ	072 31 19	AN5260	P11826 GMZ	M63 42 1	P11824 GMZ	M63 41 15
GMZ	072 31 20	AN5818	P14041 GMZ	M63 41 24	P11832 GMZ	M63 43 1
GMZ	072 32 19	AN5818	P14041 GMZ	M63 41 24	P11832 GMZ	M63 43 1

[5] The visual foxpro file is total.dbf

GMZ	072 33 16	AN4593	P11827 GMZ	M63 42 3	P11819 GMZ	M63 41 1
GMZ	072 33 18	AN4779	P14037 GMZ	M63 41 2	P11819 GMZ	M63 41 1
GMZ	072 33 19	AN5818	P14041 GMZ	M63 41 24	P11832 GMZ	M63 43 1
GMZ	072 35 16	AN5818	P14041 GMZ	M63 41 24	P11832 GMZ	M63 43 1
GMZ	072 35 17	AN5260	P11826 GMZ	M63 42 1	P11824 GMZ	M63 41 15
GMZ	072 35 18	AN5260	P11826 GMZ	M63 42 1	P11824 GMZ	M63 41 15
GMZ	072 35 19	AN5818	P14041 GMZ	M63 41 24	P11832 GMZ	M63 43 1
GMZ	072 35 20	AN5818	P14041 GMZ	M63 41 24	P11832 GMZ	M63 43 1
GMZ	072 46 1	AN4946	P11823 GMZ	M63 41 10	P11820 GMZ	M63 41 4
GMZ	072 46 2	AN4946	P11823 GMZ	M63 41 10	P11820 GMZ	M63 41 4
GMZ	072 46 3	AN4946	P11823 GMZ	M63 41 10	P11820 GMZ	M63 41 4
GMZ	072 46 5	AN5523	P11824 GMZ	M63 41 15	P14072 GMZ	M63 44 17
GMZ	072 47 2	AN5523	P11824 GMZ	M63 41 15	P14072 GMZ	M63 44 17
GMZ	072 47 3	AO0431	P11827 GMZ	M63 42 3	P11823 GMZ	M63 41 10
GMZ	072 47 4	AN5523	P11824 GMZ	M63 41 15	P14072 GMZ	M63 44 17
GMZ	072 47 5	AN5872	P14073 GMZ	M63 44 19	P11819 GMZ	M63 41 1
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GMZ	072 49 5	AN4946	P11823 GMZ	M63 41 10	P11820 GMZ	M63 41 4
GMZ	072 50 1	AN5523	P11824 GMZ	M63 41 15	P14072 GMZ	M63 44 17
GMZ	072 50 2	AN5872	P14073 GMZ	M63 44 19	P11819 GMZ	M63 41 1
GMZ	072 50 3	AN5523	P11824 GMZ	M63 41 15	P14072 GMZ	M63 44 17
GMZ	072 50 4	AN5523	P11824 GMZ	M63 41 15	P14072 GMZ	M63 44 17
GMZ	072 50 5	AN4946	P11823 GMZ	M63 41 10	P11820 GMZ	M63 41 4
GMZ	072 51 15	AN4994	P11831 GMZ	M63 42 10	P11826 GMZ	M63 42 1
GMZ	072 52 11	AN4946	P11823 GMZ	M63 41 10	P11820 GMZ	M63 41 4
GMZ	072 52 14	AN4994	P11831 GMZ	M63 42 10	P11826 GMZ	M63 42 1
GMZ	072 53 11	AO0431	P11827 GMZ	M63 42 3	P11823 GMZ	M63 41 10
GMZ	072 54 12	AO0431	P11827 GMZ	M63 42 3	P11823 GMZ	M63 41 10
GMZ	072 55 11	AO0431	P11827 GMZ	M63 42 3	P11823 GMZ	M63 41 10
GNG4	063 7 3	AM5410	P12403GNG4	142 18 20	P11498GNG4	142 18 10
GNG4	063 7 4	AM6838	P11509GNG4	142 20 1	P11495GNG4	142 18 2
GNG4	063 7 8	AM5410	P12403GNG4	142 18 20	P11498GNG4	142 18 10
GNG4	063 7 9	AM6767	P11497GNG4	142 18 7	P11495GNG4	142 18 2
GNG4	063 7 13	AM6838	P11509GNG4	142 20 1	P11495GNG4	142 18 2
GNG4	063 7 15	AM4903	P11509GNG4	142 20 1	P11512GNG4	142 20 9
GNG4	063 7 16	AM5039	P11542GNG4	142 23 16	P11502GNG4	142 19 10

GNG4	063 7 17	AM5696	P11497GNG4	142 18 7	P11498GNG4	142 18 10
GNG4	063 7 18	AM5696	P11497GNG4	142 18 7	P11498GNG4	142 18 10
GNG4	063 7 19	AM6767	P11497GNG4	142 18 7	P11495GNG4	142 18 2
GNG4	063 7 20	AM5696	P11497GNG4	142 18 7	P11498GNG4	142 18 10
GNG4	063 7 21	AM6495	P11495GNG4	142 18 2	P11502GNG4	142 19 10
GNG4	063 7 22	AM5677	P11539GNG4	142 23 2	P11502GNG4	142 19 10
GNG4	063 7 23	AM5039	P11542GNG4	142 23 16	P11502GNG4	142 19 10
GNG4	063 7 24	AM6351	P11533GNG4	142 22 20	P11541GNG4	142 23 5
GNG4	063 7 25	AM6295	P11541GNG4	142 23 5	P11538GNG4	142 23 1
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GNG4	063 8 4	AM5410	P12403GNG4	142 18 20	P11498GNG4	142 18 10
GNG4	063 8 5	AM4903	P11509GNG4	142 20 1	P11512GNG4	142 20 9
GNG4	063 8 6	AM6838	P11509GNG4	142 20 1	P11495GNG4	142 18 2
GNG4	063 8 7	AM4094	P11497GNG4	142 18 7	P11504GNG4	142 19 13
GNG4	063 8 9	AM6838	P11509GNG4	142 20 1	P11495GNG4	142 18 2
GNG4	063 8 10	AM6767	P11497GNG4	142 18 7	P11495GNG4	142 18 2
GNG4	063 8 14	AM5410	P12403GNG4	142 18 20	P11498GNG4	142 18 10
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GNG4	063 8 20	AM5146	P11494GNG4	142 18 1	P11540GNG4	142 23 4
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GNG4	063 8 24	AM6495	P11495GNG4	142 18 2	P11502GNG4	142 19 10
GNG4	063 9 1	AM5146	P11494GNG4	142 18 1	P11540GNG4	142 23 4
GNG4	063 9 7	AM4962	P11533GNG4	142 22 20	P11512GNG4	142 20 9
GNG4	063 9 13	AM5039	P11542GNG4	142 23 16	P11502GNG4	142 19 10
GNG4	063 9 14	AM4903	P11509GNG4	142 20 1	P11512GNG4	142 20 9
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GNG4	063 10 10	AN0335	P12403GNG4	142 18 20	P11504GNG4	142 19 13
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GNG4	063 10 16	AM5410	P12403GNG4	142 18 20	P11498GNG4	142 18 10
GNG4	063 10 17	AM6495	P11495GNG4	142 18 2	P11502GNG4	142 19 10

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GNG4	063 11 6	AM4903	P11509GNG4	142 20 1	P11512GNG4	142 20 9
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GNG4	063 11 9	AM5696	P11497GNG4	142 18 7	P11498GNG4	142 18 10
GNG4	063 11 11	AM5146	P11494GNG4	142 18 1	P11540GNG4	142 23 4
GNG4	063 11 13	AM6292	P11503GNG4	142 19 11	P11512GNG4	142 20 9
GNG4	063 11 15	AM5696	P11497GNG4	142 18 7	P11498GNG4	142 18 10
GNG4	063 11 16	AM7844	P11497GNG4	142 18 7	P11504GNG4	142 19 13
GNG4	063 11 21	AM2818	P11497GNG4	142 18 7	P11540GNG4	142 23 4
GNG4	063 11 22	AM5146	P11494GNG4	142 18 1	P11540GNG4	142 23 4
GNG4	063 11 24	AM4263	P11509GNG4	142 20 1	P11512GNG4	142 20 9
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GNG4	063 12 4	AM5697	P11503GNG4	142 19 11	P11502GNG4	142 19 10
GNG4	063 12 18	AN0335	P12403GNG4	142 18 20	P11504GNG4	142 19 13
GNG4	063 12 19	AN0335	P12403GNG4	142 18 20	P11504GNG4	142 19 13
GNG4	063 12 20	AM7844	P11497GNG4	142 18 7	P11504GNG4	142 19 13
GNG4	063 12 22	AM4094	P11497GNG4	142 18 7	P11504GNG4	142 19 13
GNG4	063 12 25	AM4094	P11497GNG4	142 18 7	P11504GNG4	142 19 13
GNG4	063 38 14	AL2120	P11497GNG4	142 18 7	P11541GNG4	142 23 5
GNG4	063 38 20	AL2785	P11539GNG4	142 23 2	P11495GNG4	142 18 2
GNG4	063 39 9	AM5654	P11533GNG4	142 22 20	P11504GNG4	142 19 13
GNG4	063 39 12	AM5654	P11533GNG4	142 22 20	P11504GNG4	142 19 13
GNG4	063 39 21	AL2120	P11497GNG4	142 18 7	P11541GNG4	142 23 5
GNG4	063 40 7	AM4963	P11541GNG4	142 23 5	P11512GNG4	142 20 9
GNG4	063 40 13	AM3234	P11503GNG4	142 19 11	P11540GNG4	142 23 4
GPY1	062 1 6	AN0992	P13185GPY1	091 28 19	P13222GPY1	091 37 19
GPY1	062 1 10	AN1270	P13296GPY1	091 60 24	P13262GPY1	091 48 12
GPY1	062 2 7	AN0972	P13217GPY1	091 37 14	P13222GPY1	091 37 19
GPY1	062 2 8	AN0992	P13185GPY1	091 28 19	P13222GPY1	091 37 19
GPY1	062 2 9	AN1268	P13217GPY1	091 37 14	P13227GPY1	091 38 17
GPY1	062 4 6	AN0992	P13185GPY1	091 28 19	P13222GPY1	091 37 19
GPY1	062 5 8	AN1764	P13192GPY1	091 29 2	P13207GPY1	091 31 4
GPY1	062 11 25	AN1246	P13272GPY1	091 54 6	P13262GPY1	091 48 12
GPY1	062 12 21	AN0992	P13185GPY1	091 28 19	P13222GPY1	091 37 19
GPY1	062 12 23	AN1270	P13296GPY1	091 60 24	P13262GPY1	091 48 12
GPY1	062 12 25	AN2276	P13275GPY1	091 55 4	P13260GPY1	091 48 10
GPY1	062 13 21	AN1154	P13252GPY1	091 47 9	P13222GPY1	091 37 19

GPY1	062 13 23	AN1270	P13296GPY1	091 60 24	P13262GPY1	091 48 12
GPY1	062 13 25	AN2361	P13296GPY1	091 60 24	P13222GPY1	091 37 19
GPY1	062 14 22	AN1268	P13217GPY1	091 37 14	P13227GPY1	091 38 17
GPY1	062 14 24	AN1945	P13251GPY1	091 47 8	P13259GPY1	091 48 9
GPY1	062 14 25	AN1945	P13251GPY1	091 47 8	P13259GPY1	091 48 9
GPY1	062 15 21	AN1154	P13252GPY1	091 47 9	P13222GPY1	091 37 19
GPY1	062 15 22	AN1246	P13272GPY1	091 54 6	P13262GPY1	091 48 12
GPY1	062 15 23	AN1246	P13272GPY1	091 54 6	P13262GPY1	091 48 12
GPY1	062 15 25	AN2276	P13275GPY1	091 55 4	P13260GPY1	091 48 10
GPY1	062 26 11	AN3111	P13191GPY1	091 29 1	P13259GPY1	091 48 9
GPY1	062 26 12	AN2361	P13296GPY1	091 60 24	P13222GPY1	091 37 19
GPY1	062 26 15	AN1945	P13251GPY1	091 47 8	P13259GPY1	091 48 9
GPY1	062 27 11	AN3111	P13191GPY1	091 29 1	P13259GPY1	091 48 9
GPY1	062 27 12	AN2361	P13296GPY1	091 60 24	P13222GPY1	091 37 19
GPY1	062 27 13	AN2679	P13275GPY1	091 55 4	P13207GPY1	091 31 4
GPY1	062 28 12	AN1465	P13275GPY1	091 55 4	P13250GPY1	091 46 12
GPY1	062 28 13	AN1465	P13275GPY1	091 55 4	P13250GPY1	091 46 12
GPY1	062 29 14	AN1465	P13275GPY1	091 55 4	P13250GPY1	091 46 12
GPY1	062 30 11	AN3111	P13191GPY1	091 29 1	P13259GPY1	091 48 9
GPY1	062 30 12	AN2276	P13275GPY1	091 55 4	P13260GPY1	091 48 10
GPY1	062 30 14	AN1764	P13192GPY1	091 29 2	P13207GPY1	091 31 4
GPY1	062 36 17	AN1548	P13272GPY1	091 54 6	P13231GPY1	091 39 17
GPY1	062 36 20	AN3111	P13191GPY1	091 29 1	P13259GPY1	091 48 9
GPY1	062 37 16	AN2992	P13275GPY1	091 55 4	P13204GPY1	091 31 1
GPY1	062 37 17	AN1548	P13272GPY1	091 54 6	P13231GPY1	091 39 17
GPY1	062 37 20	AN2826	P13272GPY1	091 54 6	P13227GPY1	091 38 17
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GPY1	062 40 17	AN2679	P13275GPY1	091 55 4	P13207GPY1	091 31 4
GPY1	062 40 18	AN1548	P13272GPY1	091 54 6	P13231GPY1	091 39 17
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GPY1	062 40 20	AN3286	P13168GPY1	091 25 21	P13207GPY1	091 31 4
GPY1	062 41 4	AN1154	P13252GPY1	091 47 9	P13222GPY1	091 37 19
GPY1	062 43 5	AN1548	P13272GPY1	091 54 6	P13231GPY1	091 39 17
GPY1	062 44 3	AN1268	P13217GPY1	091 37 14	P13227GPY1	091 38 17
GPY1	062 45 1	AN1268	P13217GPY1	091 37 14	P13227GPY1	091 38 17
GPY1	062 56 16	AN2276	P13275GPY1	091 55 4	P13260GPY1	091 48 10
GPY1	062 56 18	AN1270	P13296GPY1	091 60 24	P13262GPY1	091 48 12

GPY1	062 57 18	AN1154	P13252GPY1	091 47 9	P13222GPY1	091 37 19
GPY1	062 58 16	AN2992	P13275GPY1	091 55 4	P13204GPY1	091 31 1
GPY1	062 58 18	AN3111	P13191GPY1	091 29 1	P13259GPY1	091 48 9
GPY1	062 58 19	AN1764	P13192GPY1	091 29 2	P13207GPY1	091 31 4
GPY1	062 59 17	AN2361	P13296GPY1	091 60 24	P13222GPY1	091 37 19
GPY1	062 59 19	AN1764	P13192GPY1	091 29 2	P13207GPY1	091 31 4
GPY1	062 60 17	AN2826	P13272GPY1	091 54 6	P13227GPY1	091 38 17
GPY1	062 60 20	AN2358	P13251GPY1	091 47 8	P13250GPY1	091 46 12

D. FoxPro procedure used for calculations.

```
* Program Misejour.prg  to detect living trees with good data
* R. Bourdeix, January 2021

* 1) The file tempind.dbf, imported from acgrd with addionnal data from field M51, contains the inventory
* 2) The file BaseDna.dbf contains all the trees analyzed for DNA and the results
* 3) The program generates a text file which can be taken under the word software and transformed into a table showing the status of all the trees analyzed.


SET DEFAULT TO c:\aaglobal
SET TALK off
SET UNIQUE OFF

*Updating dead palms
CLOSE ALL
SELECT 2
USE tempind
DELETE FILE temp.idx
INDEX on field+STR(row)+STR(tree)+STR(yplant) TO temp
SELECT 1
USE basedna
REPLACE ALL alive WITH ''
GO top
DO WHILE NOT EOF()
STORE field+STR(row)+STR(tree)+STR(yplant) TO mclef
SELECT 2
seek mclef
IF FOUND() AND dead=0
SELECT 1
REPLACE alive WITH "Y"
ENDIF
SELECT 1
SKIP
ENDDO
* the 3 lines under will be removed if invertory is conducted on relevant fields
REPLACE ALL alive WITH 'Y' FOR ctype='Poll'
```

```
REPLACE ALL alive WITH 'Y' FOR ctype='Hyb'
REPLACE ALL alive WITH 'Y' FOR ctype='G122'

* Updating palms with fruit and bunch return
* Need a file bunch.dbf from CDM software
CLOSE ALL
SELECT 2
USE bunch
DELETE FILE temp.idx
INDEX on field+STR(row)+STR(tree)+STR(yplant) TO temp
SELECT 1
USE basedna
DO WHILE NOT EOF()
STORE field+STR(row)+STR(tree)+STR(yplant) TO mclef
SELECT 2
COUNT FOR field+STR(row)+STR(tree)+STR(yplant)=mclef TO mharvest
SELECT 1
REPLACE nbh WITH mharvest
SKIP
ENDDO
SET TALK on
SET FILTER TO nbfa>0

* Updating palms with Fruit component analysis
* Need the file fruit.dbf from CDM software

CLOSE ALL
SELECT 2
USE fruit
DELETE FILE temp.idx
INDEX on field+STR(row)+STR(tree)+STR(yplant) TO temp
SELECT 1
USE basedna
DO WHILE NOT EOF()
STORE field+STR(row)+STR(tree)+STR(yplant) TO mclef
SELECT 2
* le champ nb_samfr contient le nombre de fruits analysés
SUM nb_samfr FOR field+STR(row)+STR(tree)+STR(yplant)=mclef TO mfruit
SELECT 1
REPLACE nbfa WITH mfruit
SKIP
ENDDO
SET TALK on
REPLACE ALL nbfa WITH 24 FOR field='M51'

* Updating palms with observations  of Stem, leaves and inflorescences
* Need a file treesov.dbf containing all relevant observations
CLOSE ALL
SELECT 2
USE treesov
DELETE FILE temp.idx
```

```
INDEX on field+STR(row)+STR(tree)+STR(yplant) TO temp
SELECT 1
USE basedna
DO WHILE NOT EOF()
  STORE field+STR(row)+STR(tree)+STR(yplant) TO mclef
  SELECT 2
  SEEK mclef
  IF FOUND()
  SELECT 1
  REPLACE VC WITH 'Y'
  ENDIF
  SELECT 1
SKIP
ENDDO
SET TALK on

* Generating the big table of all palms
CLOSE all
USE baseDNA
clear
DELETE FILE temp.txt
SET ALTERNATE TO temp.txt
SET ALTERNATE on
?"Table ZZ.;
 List of alive palms with DNA analysis and their status for observations;
 of bunches and fruits, fruit component analysis and vegetative characteristics;
 (stem, leaf and inflorescence)."
?'Nb&;
Type&;
Cultivar abbreviation&;
Plot,row,tree,planting year&;
Alive&;
Number of bunches harvest&;
Number of fruits analysed&;
Vegetative observations'

SET FILTER TO
GO top
STORE 1 TO ctr
DO WHILE NOT EOF()
?ALLTRIM(STR(CTR,3))+'&'+;
ALLTRIM(Ctype)+'&'+;
ALLTRIM(var)+'&'+;
+field+STR(row,3)+STR(tree,3)+' '+STR(yplant,4)+'&'+;
Alive+'&'+;
ALLTRIM(STR(nbh,4))+'&'+;
ALLTRIM(STR(nbfa,4))+'&'+;
ALLTRIM(vc)
STORE ctr+1 TO ctr
SKIP
ENDDO
```

```
SET ALTERNATE off
SET ALTERNATE to
MODIFY COMMAND temp.txt
```