

THE PRIMITIVE COCOA GERmplasm DATABASE

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A substantial amount of cocoa germplasm exists in collections around the world. However, it is often difficult to gain information on the origins and location of this plant material. There is currently a need for an International Cocoa Germplasm Catalogue which would allow easy access to information on the material available. A project was initiated in 1988 to start to produce such a catalogue in the form of a computer database for use on IBM PC compatible computers. The first output from the project is a database containing the majority of the records of wild cocoa collected since 1938 and the present location and availability of material resulting from these collections. This Primitive Cocoa Germplasm Database has so far been distributed to 58 organisations in 34 countries.

The database has been produced using Ashton Tate's dBase IV. It has been distributed in the self-contained RunTime form so that the users do not need to own dBASE IV to access the information. The structure of the database is illustrated in Figure 1. It is made up of eight related files (square boxes), each of which contains information in a number of fields (round-cornered boxes). Files can be linked by common fields (links shown by dotted lines) so that they behave almost like a single file. The files are:

EXPEDITION: details on each expedition including the organisers and collectors involved

ORIGIN: details on the collection site of each accession

LOCATION: details on the present location and availability of germplasm

STATION: details of germplasm collections

DESCRIPTORS: details on the morphological characteristics of the clones collected on the expedition

REFERENCE: contains the full reference to the sources referred to in the expedition and location files

FORMAT: details of the different formats of the collection name encountered, e.g. LCTEEN is a format of LCT-EEN

SYNONYMS: details of the synonyms of the collection names and numbers encountered in database preparation

The **FORMAT** and **SYNONYMS** files allow clones to be referred to by any of the names that have been found during the compilation of the database

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The information in the database is accessed by making choices in a series of menus displayed on the computer screen. The user can choose to view all of the information held in any one file or produce a report which contains selected information from one or more files. For example, a user wishing to obtain information about a particular clone could list details of the collection site of the clone (Table 1), the present location of a clone (Table 2), or produce a list of addresses of the locations where the clone is held (Table 3). Reports may also be generated on:

- (i) where, when and by whom a clone was collected from the wild
- (ii) a list of all the material collected during a collecting expedition
- (iii) a list of cocoa material collected between given map coordinates, in a specified area or along a certain river
- (iv) a list of all the primitive clones held in a specified germplasm collection
- (v) a list of clone names, their origins and their synonyms

TABLE1: A SAMPLE OF THE TYPE OF INFORMATION THAT THE DATABASE CONTAINS ON THE COLLECTION SITE OF A CLONE

CLONE NAME: LCT-EEN NO.: 11

EXPEDITION:	London Cocoa Trade Amazon Project		
REFERENCE:	ALLEN, J.B., (1987). London Cocoa Trade Amazon Project. Final Report Phase Two. Cocoa Growers' Bulletin, 39. Eds. R.A. Lass and S. Sanderson.		
COLLECTORS:	JBA - J.B.Allen, JB - J.Baquero, JC - J.Cabrera, RM - R.Mera, JS - J.Strudwick, GS - G.Sobel, AI - A.Illanes, MR - M.Raffauf, LHP - L.H.Purdy.		
COUNTRY:	ECUADOR	DIVISION: Napo	AREA: Coca
LOCALITY:	Via Acua km2. Coca 2km along R. Napo		
PROPERTY:			
LATITUDE:	0°28'S	LONGITUDE: 76°50'W	ALTITUDE: 200m
TOPOGRAPHY:	flat	VEGETATION: mixed cultivation	
SOURCE:	natural habitat	MATERIAL: seed	
SURVIVAL:	yes	COLLECTION DATE: 19/05/80	
NOTES:	slightly infected		

As of March 1990, the primitive germplasm database contains information on over 2814 separate accessions of wild cocoa and the current location of over 3000 clones originating from these collections. This information has been gathered from published expedition reports and clone lists in addition to information received through personal communications. It is hoped that research stations and genebanks will further participate by supplying updated information on their clone collections. We have already received some useful feedback from users who have suggested ways in which the database can be improved and who have pointed out inconsistencies in the data. We hope to distribute a revised version of the database including these amendments in the near future.

The database can be used to provide information on the number of collections made by each expedition and the number of different clones thought to be surviving from these collections (Table 4).

TABLE 2: A SAMPLE OF THE INFORMATION THAT THE DATABASE HOLDS ON THE PRESENT LOCATION OF MATERIAL DERIVED FROM AN ACCESSION OF WILD COCOA

	LOCAL NAME: LCTEEN NO.: 11	
ORIGINAL NAME:	LCT-EEN	NO.: 11 SUFFIX: /S9
LOCATION:	International Cocoa Genebank, Trinidad	
ADDRESS:	Cocoa Research Unit, University of the West Indies, St Augustine, Trinidad	
TELEX:	24520	TELEPHONE: (1.809) 663-1364
REFERENCE:	KENNEDY, A.J. (1987). Catalogue of the Cocoa Genebank Trinidad, Cocoa Research Unit. The University of West Indies, St Augustine, Trinidad & Tobago.	

Material has been collected as budwood, cuttings or pods. Where pods have been collected, each seedling has sometimes been given a separate clone number. This is the case for the collections made by Pound and accounts for the high number of different clones. Although the Pound collections have been widely distributed and form the basis of many breeding programs, only a small number of clones are known to have survived from many of the other early expeditions. It is likely that much of this material has been lost or remains only in field collection sites for which we have no information. One of the major problems in such germplasm collections is that the identity and origins of many clones have become confused with time.

The Brazilian organisation CEPLAC has organised an extensive collecting programme in the Brazilian Amazon region. Material has been collected from over 970 trees in this region over the last 25 years. Recently, large amounts of material have also been collected from regions of Colombia, Ecuador, French Guiana and Venezuela during expeditions supported by IBPGR, LCT, IRCC and other donors. Much of this material has not yet been distributed to the major germplasm collections.

TABLE 3: A SAMPLE LIST OF THE GERmplasm COLLECTIONS HOLDING MATERIAL DERIVED FROM AN ACCESSION OF WILD COCOA

ORIGINAL NAME:	LOCAL NAME:	LOCATION:
LCT-EEN11	LCTEEN11	International Cocoa Genebank, Trinidad
LCT-EEN11	LCTEEN11	USDA, Mayaguez
LCT-EEN11	LCTEEN11	Quarantine Unit, Barbados

TABLE 4: The collecting expeditions that have taken place since 1938 with the total number of accessions made and number of surviving clones. Notes on each expedition generally include the collecting institute and the area covered by the expedition. The major collecting institutes were Assocacao Brasileira de Credito e Assistencia Rural (ABCAR), Cocoa Research Institute of Ghana (CRIG), Comissao Executiva do Plano da Lavoura Cacaueira (CEPLAC), Departamento Especial da Amazonia (DEPEA), Institute Francais de Cafe et Cacao (IRCC), Instituto Interamericano de Cooperacion para la Agricultura (IICA), Instituto Nacional de Investigaciones Agropecuarias (INIAP), Ministerio da Agricultura (Brazil) (MA), Overseas Development Agency (ODA), University of the West Indies (UWI).

Expedition	Date	Country	Area Visited	Number of Accessions	Number of Survivors
Pound Trinidad	1937-38 1942-43	Brazil, Peru, Ecuador	R. Amazon and Upper Amazon Tributaries	c.50	IMC 64 MO 26 NA 292 PA 138 POUND 10
DesRosiers & Buchwald EETP.	1948	Ecuador	R. Napo	26	2
Anglo-Colombian Trinidad.	1952	Colombia	Inc R. Putumayo, R. Caqueta & R. Apaporis	48	17
Doak, Ampuero & Buchwald, EETP	1958	Ecuador	Archidona & Tena	4	1
Doak & Zambrano, EETP.	1961	Ecuador	Archidona & Tena	43	0
Soria, Turrialba.	1964	Peru, Bolivia	Iquitos & Alto Beni	10	5
Vello CEPLAC/IICA/ CRIG.	1967	Brazil	R. Jamari, R. Acre & R. Branco	56	41
Vello CEPLAC/UWI	1967	Brazil	Ilha do Carerio, R. Branco & R. Morona R. Jurua, Cruzeiro do Sul.	33	18

Expedition	Date	Country	Area Visited	Number of Accessions	Number of Survivors
Chalmers UWI/INIAP.	1968	Ecuador	R. San Miguel, R. Aguarico, R. Coca	50	13
Vello CEPLAC/MA.	1968	Brazil	R. Jari, Cachoeira de Santo Antonio	103	11
Chalmers UWI/INIAP.	1969	Ecuador	Coca, Lago Agrio	28	8
Smithsonian S.I./Turrialba	1969	Colombia	R. Ortegua,za, R. Caqueta, R. Putamayo, R. Amazonas.	9	0
Chalmers UWI/INIAP.	1970	Ecuador	Coca, Lago Agrio, R. Aguarico	42	12
Nascimento CEPLAC/ IPEAAO/ABCAR.	1971	Brazil	R. Solimoes, Ilha de Tarara	5	5
Chalmers UWI/INIAP	1972	Ecuador	R. Bobonaza, R. Curaray, R. Nushino, R. Tiputini, R. Vallano	75	2
Carletto CEPEC/INIAP/ IFCC.	1973	Ecuador	Francisco de Orellana (Coca), R. Napo, R. Payamino	16	0
Chalmers UWI/INIAP.	1973	Ecuador, Peru Brazil	R. Tapische, Iquitos, R. Ucayali	87	14
Machado CEPLAC/DEPEA /IICA	1976	Brazil	R. Ji-Parana	c. 16	9

Expedition	Date	Country	Area Visited	Number of Accessions	Number of Survivors
CEPLAC CEPLAC/IICA /ODA.	1977	Brazil	Cacoal, Alenquer, Altamira, Baracarena, Alta Floresta, Jari, I.do Careiro	c.24	19
CEPLAC CEPLAC/DEPEA /IICA	1978	Brazil	R.Munim, R.Itapecuru, Tome-Acu, Belem, R.Iaco.	> 13	13
CEPLAC CEPLAC/DEPEA /IICA	1979	Brazil	R.Iaco, R.Caete, R.Macaua, R.Tucurui, R.Tocantins	c.73	24
Allen London Cocoa Trade.	1980	Ecuador	Amazon basin.	437	123
CEPLAC CEPLAC/DEPEA /IICA	1980	Brazil	R.Purus, R.Chandless, R.Acre, Ariquemes.	c.164	81
CEPLAC CEPLAC/DEPEA /IICA	1981	Brazil	Ariquemes, R.Tarauaca, R.Envira, R.Purus, mid-region R.Solimoes	c.175	76
CEPLAC CEPLAC/DEPEA.	1982	Brazil	Ariquemes, R.Solimoes, R.Javari, R.Curuca, R.Quixito, R.Itacoai, R.Ica, R.Japura.	c.291	162
CEPLAC CEPLAC/DEPEA /IICA	1983	Brazil	Ouro Preto, Jaru, Ji-Parana, R.Japura.	c.193	63
IBPGR/ICA.	1983	Colombia	Pacific coast of S.Colombia	76	49

Expedition	Date	Country	Area Visited	Number of Accessions	Number of Survivors
CEPLAC CEPLAC/DEPEA.	1983	Brazil	Ouro Preto d'Oeste	c.187	58
CEPLAC CEPLAC/DEPEA /CENARGEN /IICA.	1984	Brazil	Ji-Parana, R.Xingu, R.Acara, R.Uatuma.	c.280	194
Clement IRCC.	1984	Guyane		98	*
CEPLAC CEPLAC/DEPEA.	1985	Brazil	Ji-Parana	c.127	57
Ocampo Corp. Araracuara	1985	Colombia	R.Caqueta, R.Apaporis	139	2
France-Venezuela Maracay Agr. Fac /IRFA-CIRAD /IBPGR	1986	Venezuela		38	13
IBPGR IBPGR/Est. de Formento Los Brillantes.	1986	Colombia	Franje Transversal del Norte Digesa Guatemala El Peten, Malactan, San Marcos	293	80
Sallee, IRCC.	1987	Guyane	Haut Camopi	249	236
IBPGR IBPGR, U. Simon Bolivia, U. Central de Venezuela, FONAIAP.	1988	Venezuela	R.Amazon.	20	*
				Total No. Collected c.3577	Total No. Surviving c.1427

* Does not include Pound clones.

We hope to be able to add to and correct the information in the database as it becomes available. At the same time we are collecting information on improved cultivars (selected material) and morphological, yield and disease resistance characteristics of clones for the more comprehensive International Cocoa Germplasm Database. To demonstrate the potential of such a database for handling morphological information, character descriptors for a small sample of clones (the LCT-EEN clones) have been entered into the Primitive Germplasm Database. The user may search for clones which possess a combination of these characters. This sample may give some idea of the full potential of the database to supply information of use to cocoa breeders.

If you would like more information on the database or would like to contribute information to be included into the database, please contact us at the address at the head of this article.

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