

Catalogue of cacaos conserved at the CRC genebank



INTERNATIONAL COCOA
GENEBANK, TRINIDAD
AT
UNIVERSITY
COCOA RESEARCH STATION
FOUNDED 1952

Catalogue of cacaos conserved at the CRC genebank



Frances Bekele
Gillian Bidaisee
Junior Bhola
Pathmanathan Umaharan



Acknowledgements

Copyright © The Cocoa Research Centre (CRC) of the University of the West Indies and Bioversity Internacional, in representation of the Alliance of Bioversity International and the Centro Internacional de Agricultura Tropical (CIAT)

Cocoa Research Centre

The University of the West Indies - St. Augustine Campus
JHVX+8H8
Trinidad y Tobago

Bioversity International

Oficina Subregional para las Américas en Lima
Av. La Molina 1895, La Molina
Apartado Aéreo 1558
Lima 12, Perú

Coordination Catalogue Assembly and Editing: Evert Thomas

Graphic Design and Editing: Verónica Carrasco

Front and back cover painting: Romina Umaharan

Suggested Citation:

Frances Bekele, Gillian Bidaisee, Junior Bhola, Pathmanathan Umaharan (2024) Catalogue of cacaos conserved at the CRC genebank. The Cocoa Reserach center, Bioversity International and MOCCA, Trinidad, Trinidad and Tobago & Lima, Peru.

We will like to acknowledge Ms Annelle Holder-John, Agronomist, Mr. Timul Jagmohan, Foreman, and the field assistants for the day-to-day management and curation of the International Cocoa Genebank, Dr. Lambert Motilal, Geneticist, for DNA fingerprinting each tree in the collection to ensure fidelity of the collection, Mr. Marvin Lewis for GIS mapping the fields, plots and trees and digitalization of the genebank database and the past directors of the Cocoa Research Unit, Ms. Antoinette Sankar and Dr. Elizabeth Johnson for some of the photographs, Dr. Anthony Kennedy, Professor John Spence and Dr. David Butler for supporting the work.

Our deepest gratitude also goes to the Government of the Republic of Trinidad and Tobago and the Cocoa Research Association of the UK and its contributors Mondelez International Inc, Mars-Wrigley & ICE for the long-term financial support for the curation of the collection. We also acknowledge the financial support of the European Development Fund and Dutch Ministry of Agriculture, Nature and Food Quality in establishing and improving the genebank, respectively.

Development of the catalogue was made possible thanks to the MOCCA project (Maximizing Opportunities in Coffee and Cocoa in the Americas), financed by the Department of Agriculture (USDA) through its Food for Progress Program, which seeks to improve agricultural productivity and expand trade in agricultural products. Other funders of MOCCA are the J.M. companies, Smucker Company, JDE, Peets, Keurig-Dr. Pepper, Nespresso, Olam and Kellogg's. The cocoa component within the MOCCA project was led by Lutheran World Relief under the leadership of Carolina Aguilar. The editing of the catalogue received support of the CGIAR initiative on Nature Positive Solutions.

International Cocoa Genebank, Trinidad –Trinidad and Tobago

Professor Path Umaharan, Director, Cocoa Research Centre, Curator, International Cocoa Genebank, Trinidad. The University of the West Indies, Trinidad and Tobago.

BACKGROUND

The International Cocoa Genebank, Trinidad (ICGT), is regarded as the largest and most diverse cacao (*Theobroma cacao* L.) collection in the public domain with over 2300 accessions of cacao held as a field collection in Trinidad and Tobago. The Cocoa Research Centre of the University of the West Indies (CRC-UWI; www.sta.uwi.edu/cru) is the custodian of this international cacao collection. This along with the cacao collection at CATIE, Costa Rica (abbreviated IC3) are the only two cacao collections in the public domain supporting global cacao breeding programmes. The ICGT was established through consolidation of a number of historic collections held in local estates originating from expeditions carried out during the period 1935-1970 into countries that are part of the centre of diversity of cocoa (eg. Peru, Ecuador and Colombia).

The 34 ha land, in which the cacao field collection is held, is part of the La Reunion Estate, Centeno, Trinidad and Tobago; and was generously provided to the University of the West Indies by the Government of the Republic of Trinidad and Tobago (GORTT) under a 99-year lease arrangement. The collection was initially established with support from the European Development Fund through a project carried out during the period 1981-86. The collection was incorporated under Article 15 of the International Treaty on Plant Genetic Resources for Food and Agriculture. Subsequently (post 1990), accessions were added through collections from other parts of Latin America and the Caribbean region under various projects, particularly from French Guiana and other Caribbean countries. The genebank actively supports cacao breeding programmes through supply of germplasm and germplasm services.

CONSERVATION

At present the collection contains a total of 2300 plus accessions of *T. cacao*, 22 crop wild relatives belonging to the *Theobroma* and *Herrania* genera. The collection is divided into 5 fields with paved roadways separating the fields to provide easy accessibility. Cocoa being an understory tree species, permanent shade is provided to cacao by immortal (Madre de Cacao; *Erythrina poeppigiana*) planted at a spacing of 40 x 40 m. The accessions held at the genebank site (at Centeno) were initially planted in plots of 16 clonal trees per accession, but later acquisitions were planted in plots of 8 clonal trees each, to reduce the space requirement and maintenance costs. Every plot and every tree within a plot are labelled meticulously with aluminium labels tied to the trees with copper wire. The plots have more permanent labels.

When germplasm is acquired, it is first grafted onto proven rootstocks and maintained in large 16-inch pots in Cocoa Research Centre's greenhouses at University Campus at St. Augustine. They are then propagated by grafting and planted at the University campus fields or in a nursery plot at the genebank site (four clonal trees per plot). Budwood collected from these trees are then propagated by rooted cuttings (rooting response varies with genotype and can be challenging) and planted in germplasm plots with temporary shade provided by banana (*Musa acuminata*). There is hence always a lag between the acquisition of cacao accessions and their introduction into the field collection at the genebank site, as clones generated through rooting of cuttings. Propagation by rooted cuttings, although more challenging, ensures that during lean periods rootstock of grafts does not replace the intended variety. We also maintain the nursery plots containing grafts as a precaution as some accessions are susceptible to root borne diseases such as Ceratocystis wilt (CA. *Ceratocystis cacaofunesta*) and can succumb to this disease over time, requiring replacement from time to time.

Methodology for Characterization of cacao genotypes

Frances Bekele and Gillian Bidaisee

Data were collected during the same season for each group of characters/descriptors used to characterize the cacao varieties. Flush data were recorded mainly during the rainy season (May/June - November/December). Flower data were collated throughout the rainy season; mainly between July and December. The fruit (pod and bean) data were collected during the main harvest periods, which occur during the dry season (more pods are available in late December to March and May to June). Some of the colour-related characteristics observed in the laboratory were assessed under fairly uniform daylight conditions. However, an artificial light source was used for observing pigmentation in the flower under a Carl Zeiss binocular, dissecting microscope. Reference is made to the colour charts of The Royal Horticultural Society (Royal Horticultural Society, 1966).

Explanations of the descriptors (characteristics observed) and their states are presented hereunder and in Table 1.

FLUSH COLOUR

In the field, an average of four trees with flushes were selected for observation. Care was taken to ensure that the maximum expression of anthocyanin intensity was recorded since light intensity is known to affect the expression of this trait. The intensity of anthocyanin in the new terminal flushes on sun-exposed branches was noted. The concentration of anthocyanin pigment was recorded as absent, slight, intermediate or intense, accordingly. The scoring was done as follows:

Leaf, flush colour

0=absent, 3=anthocyanin pigment present in low concentration, 5=pigment present in moderate concentration, 7=pigment present in intense concentration [n=10]

FLOWER CHARACTERS/DESCRIPTORS

Ten open flowers were selected randomly from the trees in the field and stored in labelled vials. Only disease-free flowers with pearl-coloured thecae were used.

In the laboratory, the anthocyanin pigmentation of the ligule (of petal), sepal, filament (of stamen) and pedicel (flower stalk) of each flower was observed under the binocular dissecting microscope (Carl Zeiss model) (magnification $\times 10$) (eyepiece = 10, lens = 1). Anthocyanin intensity on the various floral parts is assessed on a scale of 0, 3, 5, and 7 depending on the pigment intensity.

For each of the ten flowers, one sepal was carefully removed with forceps and placed with its abaxial surface facing upwards, and its length and width measured under the binocular dissecting microscope. A petal was then randomly chosen and removed from each flower. The hood was stripped off from the petal and then the ligule was separated from the ribbon, cutting at the exact point of colour change or where the widening of the ligule begins. The ligule was then placed on a slide, covered with glycerol and set aside for measurement under the binocular compound microscope (at a higher magnification). The gynoecium (ovary and style) was also separated from each flower and placed on the centre of a slide.

Under the binocular, compound microscope (magnification $\times 40$) (Olympus BH2 model), the ligule width and the length of the style were measured using an eyepiece graticule, and the units of measurement were later converted to millimeters using a customized conversion chart. The ovary was then covered with a drop of Aniline blue with another slide placed on top so that it was squashed. The slide with the squashed ovary was placed under the binocular compound microscope and the number of ovules was counted according to the method prescribed by Lucas (Lucas and Reffye, 1981) and Subali and Abdullah (1984). The ovules were detected as luminous, yellowish green globules against a blue background under the microscope (magnification $\times 40$ (10 (eyepiece) $\times 4$ (lens))). The number of ovules per ovary were easily counted within four hours after staining.

The flower characteristics were assessed as follows:

Flower, anthocyanin intensity in column of pedicel

1=green, 2=reddish, 3=red [n=10]

Flower, anthocyanin intensity on the sepal

0=absent, 3=slight, 5=intermediate, 7=intense [n=10]

Flower, anthocyanin intensity on ligule

0=absent, 3=slight, 5=intermediate, 7=intense [n=10]

Flower, anthocyanin intensity in filament

0=absent, 3=slight, 5=intermediate, 7=intense [n=10]

Flower, sepal length (mm) [n=10]

Flower, maximum sepal width (mm) [n=10]

Flower, maximum ligule width (mm) [n=10]

Flower, style length (mm) [n=10]

Flower, ovule number [n=10]

FRUIT or POD DESCRIPTORS (4-10 representative mature fruits per tree)

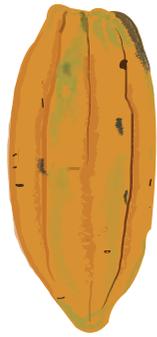
The fruit (pod and bean) data were collected during the main harvest periods. Ideally, ten representative healthy, mature, ripe fruits or pods were harvested per accession and placed in crocus bags. Pods are considered mature when the mucilage (pulp) surrounding the seeds is semi liquid and before the seeds sprout. In the laboratory, the pods were assessed in terms of size (length and width), colour, shape, basal constriction, apex, surface texture, ridge pair disposition and the separation between the ridge pairs using picture charts as a guide. The pods were cut open and the beans removed from each pod and counted. Sharp red sand was placed on the beans, which were then rubbed until the pulp was separated from the testa. This mixture was placed into a colander and rinsed under running water and the beans rubbed again until the sand and pulp mixture was removed.

The beans were then placed in a custom-built mucilage removal machine attached to a power washer and washed for approximately 2-3 minutes, then removed and placed under a blow dryer with high heat for approximately 3 minutes to remove the surface moisture. When dried, the beans were placed on a top loading balance (6000g capacity) and weighed to record the cleaned bean mass (g). The beans were then transferred to labelled aluminium containers. Three to 5 beans were selected and cut longitudinally. The intensity of anthocyanin pigment in the beans and the bean shape were then recorded. The aluminium containers with beans were then placed in a convection oven (SPECIFICATIONS- Thermo Scientific Brand Number) at 105°C for 24 hours, after which time they were removed and placed in dessicators containing silica gel.

The fruit characteristic were assessed as follows.

Fruit, shape

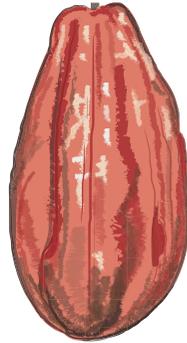
1= oblong, 2= elliptic, 3=obovate, 4= orbicular 5= oblate or 6= ovate [n=4]



Oblong



Elliptic



Obovate



Orbicular



Oblate



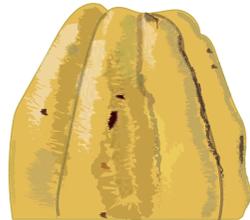
Ovate

Fruit, basal constriction

0=absent, 1=slight, 2=intermediate, 3=strong, 4=wide shoulder [n=10]



Absent



Slight



Intermediate



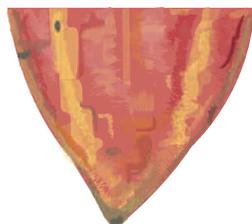
Strong

Fruit, apex form

1=attenuate, 2=acute, 3=obtus, 4=rounded, 5=mammillate, 6=indented [n=10]



Attenuate



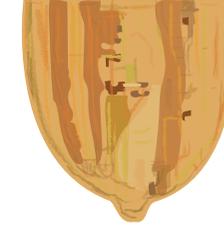
Acute



Obtus



Rounded



Mammillate



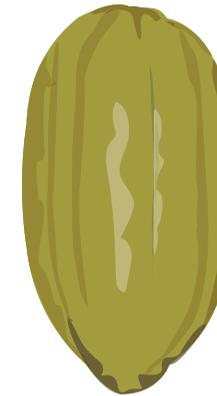
Indented

Fruit, surface texture (rugosity or degree of wartiness)

0=absent, 3=slight, 5=intermediate, 7=intense [n=10]



Absent



Slight



Intermediate



Intense

Fruit, anthocyanin (pigment) intensity on mature ridges

0=absent, 3=slight, 5=intermediate, 7=intense [n=10]

Fruit, ridge disposition

1=equidistant, 2=paired [n=10]

Fruit, primary ridge separation

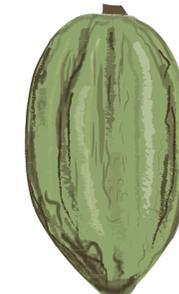
0= fused, 1=slight, 2=intermediate, 3=wide [n=10]



Fused



Slight



Intermediate



Wide

Husk hardness (MPa) [n=10]

Fruit, length (cm) [n=10]

Fruit, width (cm) [n=10]

BEAN DESCRIPTORS

Two beans were randomly selected from each aluminium container and the testae separated from the cotyledon using a dissecting needle. This was done to facilitate the recording of cotyledon and testa masses. A digital Vernier callipers was used to measure and record the bean length and bean width of cotyledons. Each cotyledon was then weighed (OHAUS Galaxy balance), as well as the testa for the first bean.

The pod index was calculated by dividing 1000 by the product of average bean number and individual dried cotyledon mass (g).

Seed (bean), number

Average [n=10]

Seed (bean), shape

1=oblong 2=elliptic 3=ovate [n=10]



Seed (bean), cotyledon colour

1=white, 2=grey, 3=light purple, 4=medium purple, 5=dark purple, 6=mottled [n=10]

Washed seed mass (total) (g) [n=10]

Individual seed mass (wet or dried)

average= total wet seed weight divided by seed number (small= smaller than 1.0 g, medium= 1.0 - 2.99 g, large= bigger than 3.0 g) or average (individual) dried cotyledon weight [n=20; 2 seeds per pod]

Cotyledon mass (g) [n=20]

Cotyledon length (cm) [n=20]

Cotyledon width (cm) [n=20]

Pod index

The number of pods required to produce 1 kg of dried cocoa (1000/(average individual dried bean mass × average bean number per pod))

LITERATURE

- Iwaro, Adeniyi D., Frances L. Bekele, and David R. Butler. "Evaluation and utilisation of cacao (*Theobroma cacao* L.) germplasm at the International Cocoa Genebank, Trinidad." *Euphytica* 130 (2003): 207-221.
- Khan, Nalini, Lambert A. Motilal, Darin A. Sukha, Frances L. Bekele, Adeniyi D. Iwaro, Gillian G. Bidaisee, Pathmanathan Umaharan, Lebert H. Grierson and Dapeng Zhang. Variability of butterfat content in cacao (*Theobroma cacao* L.): combination and correlation with other seed-derived traits at the International Cocoa Genebank, Trinidad. *Plant Genetic Resources* 6(03) (2008): 175-186.
- Lucas, P. and Reffye, P.H. de 1981. Assessment of genetic parameters for some cocoa tree clones. pp. 541-543 in Proc. of the 7th International Cocoa Research Conference, Douala, Cameroon, 1979.
- Luz, Edna D.M.N., Milton M. Yamada, Stela D. Silva et al. "Research on cacao resistance to Black Pod disease in Bahia, Brazil (1980-1995)." In Proceedings of the International Workshop on the Contribution of Disease Resistance to Cocoa Variety Improvement, Salvador, Brazil, November 24-26 November 1996, edited by Frances Bekele, Michelle J. End and Albertus B. Eskes, London, United Kingdom: INGENIC (International Group for the Genetic Improvement of Cocoa) (1999): 57-66.
- Phillips-Mora, Wilbert, Adriana Arciniegas Leal, Allan Mata Quirós, and Juan C. Motamayor Arias. Catalogue of cacao clones selected by CATIE for commercial plantings. (2013).
- Pound, Francis J. "The genetic constitution of the cacao crop." A Report on Cocoa Research for 1932, Imperial College of Tropical Agriculture, St. Augustine, Trinidad and Tobago (1933): 10-24.
- Royal Horticultural Society 1966. The Royal Horticultural Society (in association with the Flower Council of Holland) R.H.S. Colour Chart. Leiden, London.
- Subali S. and Abdullah I. 1984. Preliminary studies on cocoa ovules in relation to bean number and bean size. In: Proc. of the International Conference on Cocoa and Coconuts, Kuala Lumpur, Malaysia, 1984.

**Cacao Genotypes
Conserved at the
International
Cocoa Genebank,
Trinidad (ICGT)**

AM 1/8



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or oblong
Pod apex form: Obtuse or obtuse-indent
Pod basal constriction: Strong or intermediate
Pod surface texture: Slight or intermediate wartiness
Ridges: paired with slight (few intermediate) separation of ridge pairs; prominent ridges
Pod length (cm): 20.5 (2.1)
Pod width (cm): 10.1 (0.7)
Pod index: 21.39



3. Flower Characteristics

Ligule: Slight Anthocyanin Concentration (Some With No Anthocyanin)
Filament: Intense Anthocyanin Concentration
Pedicel: Red
Ovule No: 48 (6)
Ovule No. Maximum: 56
Sepal length (mm): 9.40 (0.91)
Sepal width (mm): 2.24 (0.22)
Ligule width (mm): 2.500 (0.194)
Style length (mm): 3.126 (0.381)



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Medium Purple
Bean number: 38 (9)
Cotyledon mass (g): 1.23 (0.16)
Cotyledon length (cm): 2.37 (0.12)
Cotyledon width (cm): 1.39 (0.07)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

AM 1/57



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Oblong
Pod apex form: Obtuse-indent
Pod basal constriction: Slight
Pod surface texture: Slight wartiness (some tending to intermediate wartiness)
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 15.1 (0.9)
Pod width (cm): 8.8 (0.4)
Pod index: 20.96



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: Slight anthocyanin concentration
Pedicel: Reddish
Ovule No: 55 (1)
Ovule No. Maximum: 57
Sepal length (mm): 7.39 (0.21)
Sepal width (mm): 2.39 (0.12)
Ligule width (mm): 2.601 (0.212)
Style length (mm): 2.267 (0.209)



2. Seed / Bean Characteristics

Bean shape: Ovate
Cotyledon colour: Dark purple (some medium purple)
Bean number: 53 (5)
Cotyledon mass (g): 0.90 (0.10)
Cotyledon length (cm): 2.33 (0.12)
Cotyledon width (cm): 1.25 (0.06)



4. Leaf Characteristics

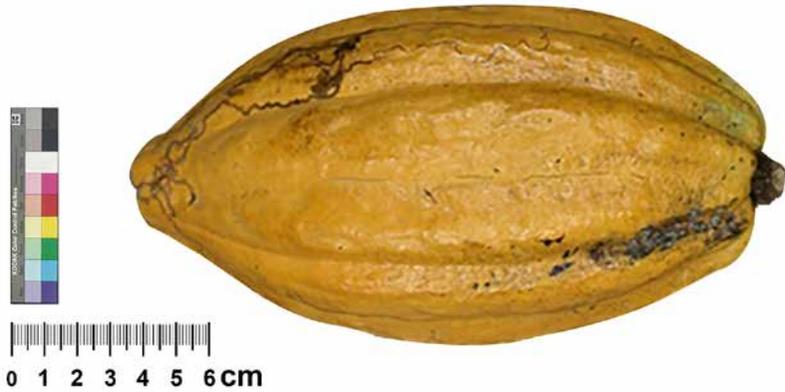
Flush colour: Moderate anthocyanin concentration

5. Notes

Good Black Pod disease tolerance



B 9/10-25



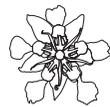
1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse-indentated
Pod basal constriction: Intermediate
Pod surface texture: Intermediate wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs; prominent ridges
Pod length (cm): 18.6 (1.4)
Pod width (cm): 9.0 (0.4)
Pod index: 19.76



2. Seed / Bean Characteristics

Bean shape: Oblong (some elliptic)
Cotyledon colour: Medium purple (some dark purple)
Bean number: 46 (2)
Cotyledon mass (g): 1.10 (0.09)
Cotyledon length (cm): 2.35 (0.11)
Cotyledon width (cm): 1.16 (0.08)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: Slight anthocyanin concentration or no anthocyanin
Pedicel: Red or reddish
Ovule No: 44 (4)
Ovule No. Maximum: 50
Sepal length (mm): 9.06 (0.54)
Sepal width (mm): 2.21 (0.14)
Ligule width (mm): 2.48 (0.10)
Style length (mm): 2.80 (0.07)



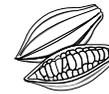
4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

5. Notes

Good Black Pod disease tolerance

B 9/10-32



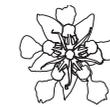
1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Acute (blunt with an indentation)
Pod basal constriction: Strong or intermediate
Pod surface texture: Slight wartiness
Ridges: Paired with wide separation of ridge pairs
Pod length (cm): 16.2 (1.5)
Pod width (cm): 9.0 (0.7)
Pod index: 22.52



2. Seed / Bean Characteristics

Bean shape: Ovate (some elliptic)
Cotyledon colour: Medium purple (some light purple or dark purple)
Bean number: 37 (5)
Cotyledon mass (g): 1.20 (0.20)
Cotyledon length (cm): 2.35 (0.17)
Cotyledon width (cm): 1.22 (0.10)



3. Flower Characteristics

Ligule: No anthocyanin concentration
Filament: Slight anthocyanin concentration
Pedicel: Red or reddish
Ovule No: 43 (2)
Ovule No. Maximum: 47
Sepal length (mm): 8.77 (0.40)
Sepal width (mm): 2.12 (0.10)
Ligule width (mm): 2.66 (0.13)
Style length (mm): 2.62 (0.15)



4. Leaf Characteristics

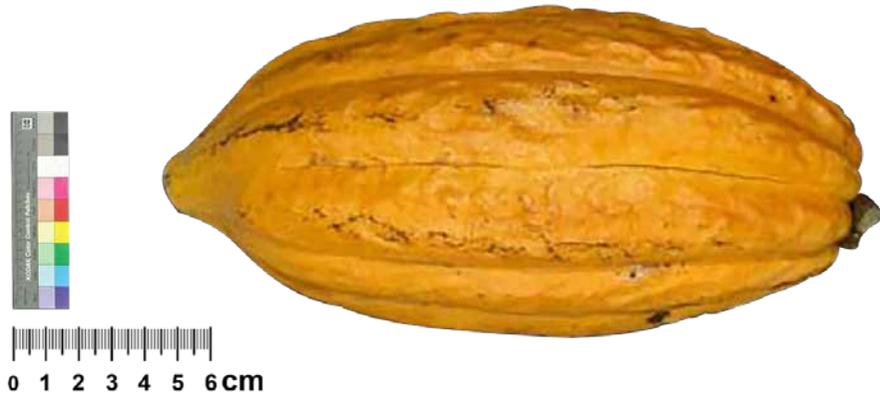
Flush colour: Low anthocyanin concentration

5. Notes

Good Black Pod disease tolerance; Butterfat = 52.4%



CL 10/5



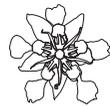
1. Fruit Characteristics

Colour of mature pod: Intermediate or slight anthocyanin concentration on ridges
Pod shape: Elliptic
Pod apex form: Acute (blunt)
Pod basal constriction: Slight or intermediate
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 18.4 (1.7)
Pod width (cm): 8.8 (1.1)
Pod index: 19.28



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Medium purple (some light purple)
Bean number: 39 (9)
Cotyledon mass (g): 1.33 (0.13)
Cotyledon length (cm): 2.37 (0.22)
Cotyledon width (cm): 1.23 (0.08)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: Slight anthocyanin concentration
Pedicel: Red
Ovule No: 48 (4)
Ovule No. Maximum: 53
Sepal length (mm): 6.43 (0.24)
Sepal width (mm): (not recorded)
Ligule width (mm): 2.37 (0.24)
Style length (mm): 2.45 (0.27)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration

5. Notes

Good Black Pod disease tolerance

CL 10/27



1. Fruit Characteristics

Colour of mature pod: Slight anthocyanin concentration on ridges or yellow
Pod shape: Elliptic
Pod apex form: Acute or obtuse
Pod basal constriction: Slight
Pod surface texture: Slight wartiness
Ridges: Paired with intermediate separation of ridge pairs; prominent ridges
Pod length (cm): 15.3 (0.6)
Pod width (cm): 8.2 (0.4)
Pod index: 24.80



2. Seed / Bean Characteristics

Bean shape: Oblong (some elliptic or ovate)
Cotyledon colour: Dark purple
Bean number: 37 (3)
Cotyledon mass (g): 1.09 (0.14)
Cotyledon length (cm): 2.29 (0.18)
Cotyledon width (cm): 1.25 (0.08)



3. Flower Characteristics

Ligule: Intermediate or slight anthocyanin concentration
Filament: Slight anthocyanin concentration
Pedicel: Red
Ovule No: 36 (3)
Ovule No. Maximum: 43
Sepal length (mm): 9.41 (1.00)
Sepal width (mm): 2.28 (0.15)
Ligule width (mm): 2.46 (0.20)
Style length (mm): 2.24 (0.18)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration



COCA 3348/44



1. Fruit Characteristics

Colour of mature pod: Slight anthocyanin concentration on ridges or yellow

Pod shape: Elliptic or oblong

Pod apex form: Obtuse or obtuse-indent

Pod basal constriction: Intermediate or slight

Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with wide (some intermediate) separation of ridge pairs

Pod length (cm): 16.6 (1.3)

Pod width (cm): 8.0 (0.5)

Pod index: 22.22

2. Seed / Bean Characteristics

Bean shape: Elliptic (some ovate)

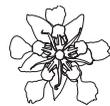
Cotyledon colour: Medium purple

Bean number: 50 (7)

Cotyledon mass (g): 0.90 (0.25)

Cotyledon length (cm): 2.23 (0.17)

Cotyledon width (cm): 1.16 (0.09)



3. Flower Characteristics

Ligule: No anthocyanin

Filament: No anthocyanin

Pedicel: Red or reddish

Ovule No: 48 (5)

Ovule No. Maximum: 56

Sepal length (mm): 6.48 (0.76)

Sepal width (mm): 1.99 (0.27)

Ligule width (mm): 2.431 (0.356)

Style length (mm): 1.725 (0.233)

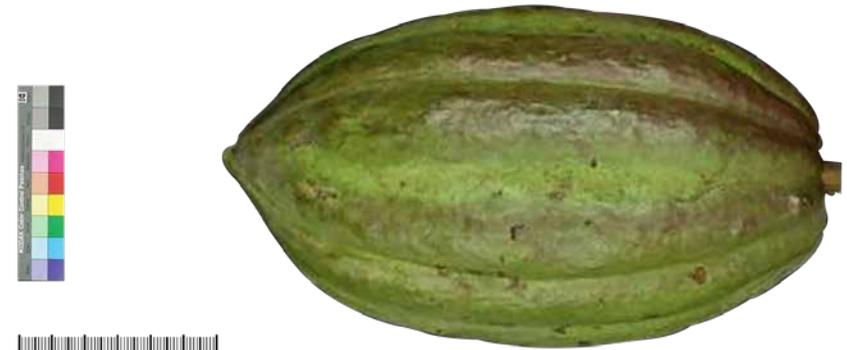


4. Leaf Characteristics

Flush colour: Low anthocyanin concentration



DOM 14



1. Fruit Characteristics

Colour of mature pod: Slight anthocyanin concentration on ridges

Pod shape: Oblong or elliptic
Pod apex form: Acute (blunt) or mammillate

Pod basal constriction: Slight (some tending to intermediate)

Pod surface texture: Slight wartiness (some almost intermediate)

Ridges: Paired with intermediate (some wide) separation of ridge pairs

Pod length (cm): 15.9 (1.4)

Pod width (cm): 9.3 (0.6)

Pod index: 23.23



2. Seed / Bean Characteristics

Bean shape: Oblong (some elliptic)

Cotyledon colour: Dark purple (some medium or light purple)

Bean number: 41 (5)

Cotyledon mass (g): 1.05 (0.08) (0.06)

Cotyledon length (cm): 2.28 (0.05)

Cotyledon width (cm): 1.16 (0.05)



3. Flower Characteristics

Ligule: No anthocyanin

Filament: No anthocyanin

Pedicel: Red or reddish

Ovule No: 47 (5)

Ovule No. Maximum: 52

Sepal length (mm): 7.79 (0.33)

Sepal width (mm): 2.42 (0.18)

Ligule width (mm): 2.98 (0.24)

Style length (mm): 2.48 (0.19)



4. Leaf Characteristics

Flush colour: Intense anthocyanin concentration



EET 162



0 1 2 3 4 5 6 cm



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or oblong
Pod apex form: Obtuse
Pod basal constriction: Intermediate
Pod surface texture: Slight wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 15.5 (1.5)
Pod width (cm): 8.5 (0.5)
Pod index: 24.01



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Dark purple (few medium purple)
Bean number: 35 (8)
Cotyledon mass (g): 1.19 (0.38)
Cotyledon length (cm): 2.17 (0.30)
Cotyledon width (cm): 1.32 (0.15)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: Slight anthocyanin concentration
Pedicel: Red or reddish
Ovule No: 38 (5)
Ovule No. Maximum: 45
Sepal length (mm): 9.14 (0.56)
Sepal width (mm): 2.33 (0.32)
Ligule width (mm): 2.91 (0.30)
Style length (mm): 2.10 (0.24)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

EET 272



0 1 2 3 4 5 6 cm



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse or obtuse-indent
Pod basal constriction: Slight or intermediate
Pod surface texture: Slight wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 14.8 (2.8)
Pod width (cm): 8.0 (1.0)
Pod index: 25.03



2. Seed / Bean Characteristics

Bean shape: Oblong (some elliptic)
Cotyledon colour: Medium purple (some dark purple)
Bean number: 47 (5)
Cotyledon mass (g): 0.85 (0.27)
Cotyledon length (cm): 2.22 (0.14)
Cotyledon width (cm): 1.31 (0.10)



3. Flower Characteristics

Ligule: Intermediate or slight anthocyanin concentration (few with no anthocyanin)
Filament: Slight anthocyanin concentration (some with no anthocyanin)
Pedicel: Red, reddish or green
Ovule No: 45 (5)
Ovule No. Maximum: 55
Sepal length (mm): 6.34 (0.79)
Sepal width (mm): 2.28 (0.25)
Ligule width (mm): 2.21 (0.38)
Style length (mm): 2.00 (0.27)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

5. Notes

Good Black Pod disease tolerance



EET 399



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Oblong or elliptic
Pod apex form: Attenuate
Pod basal constriction: Strong or intermediate
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 16.4 (3.2)
Pod width (cm): 8.1 (0.9)
Pod index: 24.37



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: Slight anthocyanin concentration (some with no anthocyanin)
Pedicel: Reddish or green
Ovule No: 42 (4)
Ovule No. Maximum: 49
Sepal length (mm): 8.57 (0.72)
Sepal width (mm): 2.31 (0.20)
Ligule width (mm): 2.47 (0.22)
Style length (mm): 2.08 (0.28)



2. Seed / Bean Characteristics

Bean shape: Oblong
Cotyledon colour: Medium purple (few dark purple or gray)
Bean number: 36 (10)
Cotyledon mass (g): 1.14 (0.29)
Cotyledon length (cm): 2.41 (0.14)
Cotyledon width (cm): 1.21 (0.13)



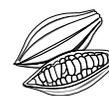
4. Leaf Characteristics

Flush colour: No anthocyanin

5. Notes

Good Black Pod disease tolerance

FSC 13



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Acute (blunt, some blunt-nosed)
Pod basal constriction: Intermediate
Pod surface texture: Intermediate wartiness (few slight)
Ridges: Paired with intermediate (some wide) separation of ridge pairs
Pod length (cm): 17.6 (0.8)
Pod width (cm): 9.7 (0.5)
Pod index: 19.94



3. Flower Characteristics

Ligule: Intermediate or slight anthocyanin concentration (some with no anthocyanin)
Filament: Intermediate or slight anthocyanin concentration
Pedicel: Red
Ovule No: 50 (5)
Ovule No. Maximum: 58
Sepal length (mm): 8.45 (0.46)
Sepal width (mm): 2.58 (0.12)
Ligule width (mm): 2.770 (0.225)
Style length (mm): 2.822 (0.268)



2. Seed / Bean Characteristics

Bean shape: Elliptic (few ovate)
Cotyledon colour: Dark purple (some medium purple)
Bean number: 46 (3)
Cotyledon mass (g): 1.09 (0.22)
Cotyledon length (cm): 2.32 (0.22)
Cotyledon width (cm): 1.34 (0.09)

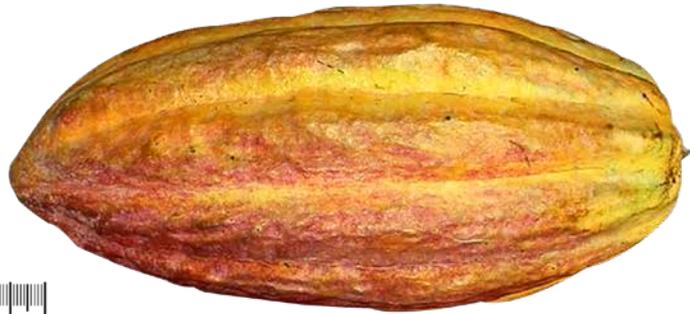


4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration



ICS 1



1. Fruit Characteristics

Colour of mature pod:

Intermediate or slight anthocyanin concentration on ridges; furrows have little or no anthocyanin

Pod shape: Elliptic or oblong

Pod apex form: Acute (blunt) (some obtuse-indent)

Pod basal constriction: Strong or intermediate

Pod surface texture:

Intermediate wartiness

Ridges: Paired with slight (some intermediate) separation of ridge pairs

Pod length (cm): 16.2 (0.5)

Pod width (cm): 8.0 (0.3)

Pod index: 19.88



2. Seed / Bean Characteristics

Bean shape: Elliptic

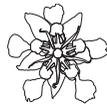
Cotyledon colour: Medium purple or light purple

Bean number: 39 (5)

Cotyledon mass (g): 1.29 (0.23)

Cotyledon length (cm): 2.58 (0.21)

Cotyledon width (cm): 1.38 (0.09)



3. Flower Characteristics

Ligule: No anthocyanin

Filament: No anthocyanin

Pedicel: Red

Ovule No: 39 (3)

Ovule No. Maximum: 47

Sepal length (mm): 9.07 (0.49)

Sepal width (mm): 2.85 (0.15)

Ligule width (mm): 1.676 (0.129)

Style length (mm): 1.73 (0.19)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

5. Notes

Good Black Pod disease tolerance. Pod resistance to Witches' Broom disease (in Trinidad)

ICS 5



1. Fruit Characteristics

Colour of mature pod: Intense or intermediate anthocyanin concentration on ridges

Pod shape: Elliptic

Pod apex form: Acute (few obtuse-indent)

Pod basal constriction:

Intermediate or slight

Pod surface texture:

Intermediate or slight wartiness

Ridges: Paired with intermediate separation of ridge pairs

Pod length (cm): 18.8 (1.6)

Pod width (cm): 8.2 (0.3)

Pod index: 16.98



2. Seed / Bean Characteristics

Bean shape: Elliptic

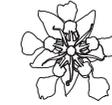
Cotyledon colour: Medium purple (few light purple)

Bean number: 43 (4)

Cotyledon mass (g): 1.37 (0.20)

Cotyledon length (cm): 2.53 (0.18)

Cotyledon width (cm): 1.36 (0.11)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)

Filament: No anthocyanin

Pedicel: Red or reddish

Ovule No: 42 (5)

Ovule No. Maximum: 49

Sepal length (mm): 8.16 (0.54)

Sepal width (mm): 2.03 (0.21)

Ligule width (mm): 1.99 (0.10)

Style length (mm): 1.79 (0.15)



4. Leaf Characteristics

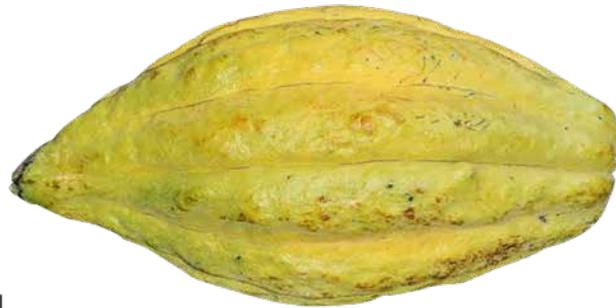
Flush colour: No anthocyanin

5. Notes

Good Black Pod disease tolerance.



ICS 39



1. Fruit Characteristics

Colour of mature pod: yellow
Pod shape: Oblong or elliptic
Pod apex form: Attenuate (few acute)
Pod basal constriction: Intermediate or slight
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 17.6 (2.1)
Pod width (cm): 7.7 (0.7)
Pod index: 22.10



2. Seed / Bean Characteristics

Bean shape: Ovate (some elliptic)
Cotyledon colour: Medium purple (some light purple)
Bean number: 39 (3)
Cotyledon mass (g): 1.16 (0.25)
Cotyledon length (cm): 2.30 (0.27)
Cotyledon width (cm): 1.38 (0.10)



3. Flower Characteristics

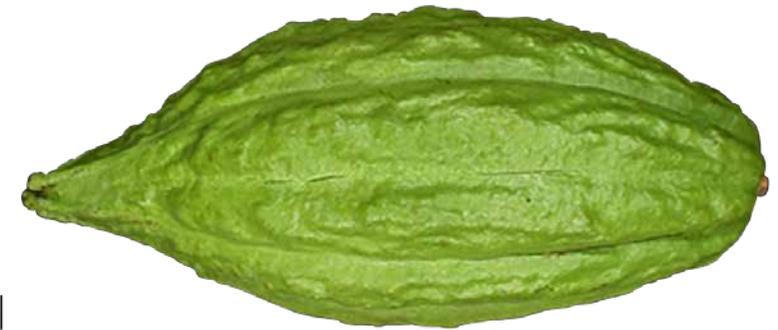
Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: No anthocyanin
Pedicel: Red or reddish
Ovule No. Maximum: 42 (4)
Ovule No. Maximum: 47
Sepal length (mm): 8.47 (0.37)
Sepal width (mm): 2.53 (0.19)
Ligule width (mm): 3.20 (0.35)
Style length (mm): 2.25 (0.13)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

ICS 42



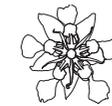
1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic (some tending to oblong)
Pod apex form: Attenuate (with five-angled tip, some acute)
Pod basal constriction: Intermediate or slight (few strong)
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs; prominent ridges
Pod length (cm): 20.0 (2.6)
Pod width (cm): 8.7 (0.7)
Pod index: 22.28



2. Seed / Bean Characteristics

Bean shape: Elliptic (some oblong)
Cotyledon colour: Medium purple (some light purple, few dark purple)
Bean number: 33 (5)
Cotyledon mass (g): 1.36 (0.19)
Cotyledon length (cm): 2.51 (0.15)
Cotyledon width (cm): 1.36(0.06)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration or no anthocyanin
Filament: No anthocyanin
Pedicel: Reddish or red
Ovule No. Maximum: 43 (7)
Ovule No. Maximum: 59
Sepal length (mm): 10.53 (0.49)
Sepal width (mm): 2.52 (0.24)
Ligule width (mm): 2.87 (0.26)
Style length (mm): 2.50 (0.25)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration



ICS 43



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or oblong
Pod apex form: Attenuate or acute
Pod basal constriction: Strong (few slight)
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate separation of ridge pairs; prominent ridges
Pod length (cm): 19.4 (2.1)
Pod width (cm): 8.3 (0.9)
Pod index: 16.05



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: No anthocyanin
Pedicle: Red
Ovule No: 34 (4)
Ovule No. Maximum: 46
Sepal length (mm): 8.01 (0.20)
Sepal width (mm): 2.33 (0.17)
Ligule width (mm): 2.169 (0.272)
Style length (mm): 1.844 (0.179)



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Medium purple (some dark purple or light purple)
Bean number: 38 (8)
Cotyledon mass (g): 1.64 (0.26)
Cotyledon length (cm): 2.71 (0.20)
Cotyledon width (cm): 1.55 (0.14)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration

ICS 48



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Acute (some broad attenuate)
Pod basal constriction: Slight or absent (few intermediate)
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 16.9 (2.3)
Pod width (cm): 8.0 (1.0)
Pod index: 20.13



3. Flower Characteristics

Ligule: No anthocyanin
Filament: No anthocyanin
Pedicle: Red or reddish
Ovule No: 40 (3)
Ovule No. Maximum: 46
Sepal length (mm): 8.29 (0.28)
Sepal width (mm): 2.27 (0.21)
Ligule width (mm): 2.95 (0.58)
Style length (mm): 2.17 (0.26)



2. Seed / Bean Characteristics

Bean shape: Elliptic (some oblong)
Cotyledon colour: Medium purple (some dark purple)
Bean number: 36 (6)
Cotyledon mass (g): 1.38 (0.34)
Cotyledon length (cm): 2.52 (0.25)
Cotyledon width (cm): 1.43 (0.14)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration



ICS 63



1. Fruit Characteristics

Colour of mature pod: Intense anthocyanin concentration
Pod shape: Elliptic or oblong
Pod apex form: Obtuse-indentured (short, almost rounded)
Pod basal constriction: Absent or slight
Pod surface texture: Slight wartiness or smooth
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 14.7 (1.0)
Pod width (cm): 8.3 (0.4)
Pod index: 19.57



3. Flower Characteristics

Ligule: No anthocyanin
Filament: No anthocyanin
Pedicel: Red
Ovule No: 39 (4)
Ovule No. Maximum: 46
Sepal length (mm): 7.31 (0.54)
Sepal width (mm): 2.20 (0.14)
Ligule width (mm): 2.446 (0.402)
Style length (mm): 1.52 (0.48)



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Medium purple (some light purple, few dark purple)
Bean number: 39 (4)
Cotyledon mass (g): 1.31 (0.16)
Cotyledon length (cm): 2.57 (0.16)
Cotyledon width (cm): 1.42 (0.08)



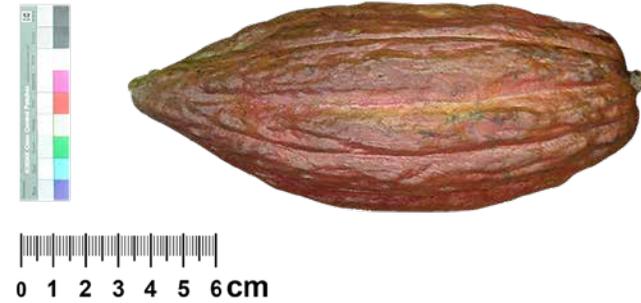
4. Leaf Characteristics

Flush colour: Intense anthocyanin concentration

5. Notes

Good Black Pod disease tolerance.

ICS95



1. Fruit Characteristics

Colour of mature pod: Intermediate anthocyanin concentration
Pod shape: Elliptic
Pod apex form: Acute
Pod basal constriction: Slight (few intermediate)
Pod surface texture: Intermediate wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 19.0 (1.9)
Pod width (cm): 8.4 (0.7)
Pod index: 22.15



3. Flower Characteristics

Ligule: No anthocyanin (few with slight anthocyanin concentration)
Filament: No anthocyanin
Pedicel: Red or reddish
Ovule No: 39 (3)
Ovule No. Maximum: 44
Sepal length (mm): 7.12 (0.54)
Sepal width (mm): 2.10 (0.12)
Ligule width (mm): 2.314 (0.169)
Style length (mm): 1.911 (0.143)



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Light purple or medium purple
Bean number: 35 (7)
Cotyledon mass (g): 1.29 (0.21)
Cotyledon length (cm): 2.43 (0.15)
Cotyledon width (cm): 1.30 (0.10)



4. Leaf Characteristics

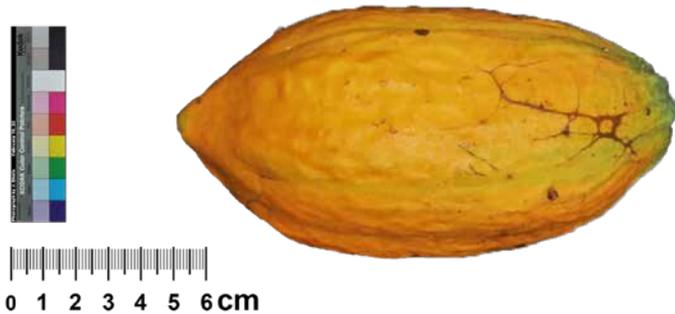
Flush colour: Intense anthocyanin concentration

5. Notes

Adaptable, tolerant to Frosty Pod (FP), tolerant to Vascular Streak Dieback.



IMC 6



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Oblong
Pod apex form: Obtuse
Pod basal constriction: Slight or intermediate
Pod surface texture: Slight or intermediate wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 18.2 (1.8)
Pod width (cm): 9.1 (1.1)
Pod index: 23.88



2. Seed / Bean Characteristics

Bean shape: Ovate
Cotyledon colour: Dark purple (some medium purple)
Bean number: 53 (6)
Cotyledon mass (g): 0.79 (0.06)
Cotyledon length (cm): 2.08 (0.14)
Cotyledon width (cm): 1.01 (0.07)



3. Flower Characteristics

Ligule: No anthocyanin
Filament: No anthocyanin
Pedicle: Reddish
Ovule No: 52 (6)
Ovule No. Maximum: 65
Sepal length (mm): 7.05 (0.50)
Sepal width (mm): 2.90 (0.46)
Ligule width (mm): 2.67 (0.10)
Style length (mm): 2.47 (0.13)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration

IMC 27



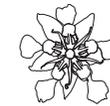
1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Oblong (tending to elliptic)
Pod apex form: Obtuse-indentured
Pod basal constriction: Slight
Pod surface texture: Slight wartiness
Ridges: Paired with intermediate separation (some wide) of ridge pairs
Pod length (cm): 17.7 (1.5)
Pod width (cm): 9.4 (0.7)
Pod index: 19.70



2. Seed / Bean Characteristics

Bean shape: Oblong
Cotyledon colour: Medium purple (some dark purple)
Bean number: 54 (5)
Cotyledon mass (g): 0.94 (0.17)
Cotyledon length (cm): 2.35 (0.15)
Cotyledon width (cm): 1.07 (0.12)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: Intermediate anthocyanin concentration
Pedicle: Reddish or green
Ovule No: 52 (3)
Ovule No. Maximum: 57
Sepal length (mm): 7.66 (0.41)
Sepal width (mm): 2.40 (0.23)
Ligule width (mm): 2.04 (0.16)
Style length (mm): 1.83 (0.18)



4. Leaf Characteristics

Flush colour: No anthocyanin

5. Notes

Good Witches' Broom tolerance;
 Moderate Frosty Pod tolerance

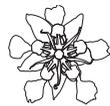


IMC 31



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse or obtuse-indent
Pod basal constriction: Slight (few intermediate)
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 18.0 (2.7)
Pod width (cm): 8.4 (0.6)
Pod index: 23.15



3. Flower Characteristics

Ligule: Intermediate or slight anthocyanin concentration (some with no anthocyanin)
Filament: Intermediate or slight anthocyanin concentration (some with no anthocyanin)
Pedicle: Red or reddish
Ovule No: 52 (4)
Ovule No. Maximum: 59
Sepal length (mm): 7.26 (0.80)
Sepal width (mm): 2.39 (0.25)
Ligule width (mm): 2.55 (0.25)
Style length (mm): 2.11 (0.24)



2. Seed / Bean Characteristics

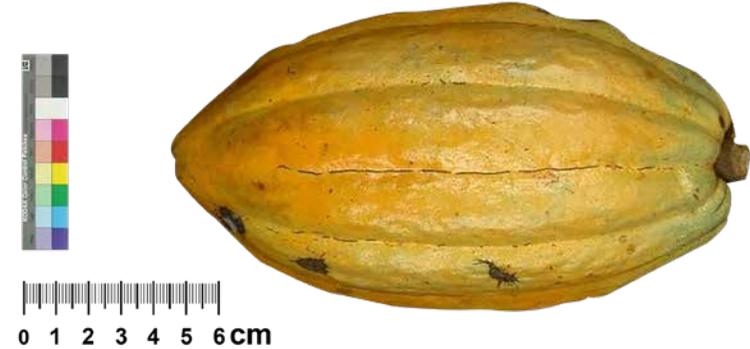
Bean shape: Oblong
Cotyledon colour: Medium purple (some light purple, few dark purple)
Bean number: 45 (13)
Cotyledon mass (g): 0.96 (0.11)
Cotyledon length (cm): 2.30 (0.17)
Cotyledon width (cm): 1.31 (0.26)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration

IMC 54



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse-indent
Pod basal constriction: Intermediate
Pod surface texture: Slight wartiness or smooth
Ridges: Paired with wide (some intermediate) separation of ridge pairs
Pod length (cm): 16.9 (1.6)
Pod width (cm): 8.9 (0.7)
Pod index: 24.99



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: Intermediate or slight anthocyanin concentration
Pedicle: Reddish
Ovule No: 58 (4)
Ovule No. Maximum: 63
Sepal length (mm): 7.90 (0.74)
Sepal width (mm): 2.83 (0.24)
Ligule width (mm): 3.22 (0.31)
Style length (mm): 2.49 (0.22)



2. Seed / Bean Characteristics

Bean shape: Oblong (few ovate)
Cotyledon colour: Medium purple (some light purple)
Bean number: 46 (7)
Cotyledon mass (g): 0.87 (0.14)
Cotyledon length (cm): 2.19 (0.13)
Cotyledon width (cm): 1.10 (0.08)

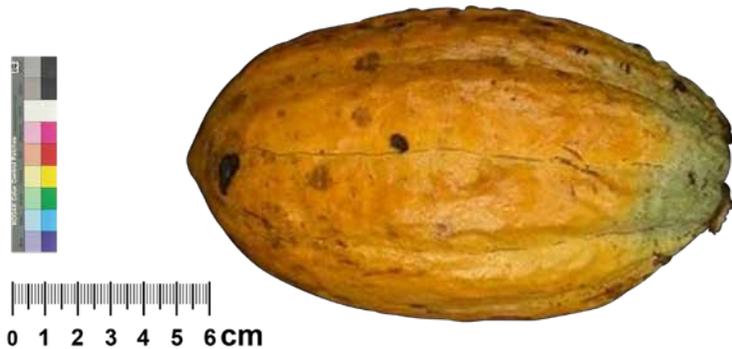


4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration



IMC 55



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or oblong
Pod apex form: Obtuse or obtuse-indent
Pod basal constriction: Slight or absent
Pod surface texture: Slight wartiness or smooth
Ridges: Paired with intermediate (some wide) separation of ridge pairs; slightly prominent ridges
Pod length (cm): 16.6 (1.5)
Pod width (cm): 9.6 (2.5)
Pod index: 23.17



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: Intermediate or slight anthocyanin concentration
Pedicel: Reddish
Ovule No: 51 (5)
Ovule No. Maximum: 59
Sepal length (mm): 7.10 (0.32)
Sepal width (mm): 2.63 (0.30)
Ligule width (mm): 2.47 (0.22)
Style length (mm): 2.15 (0.24)



2. Seed / Bean Characteristics

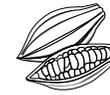
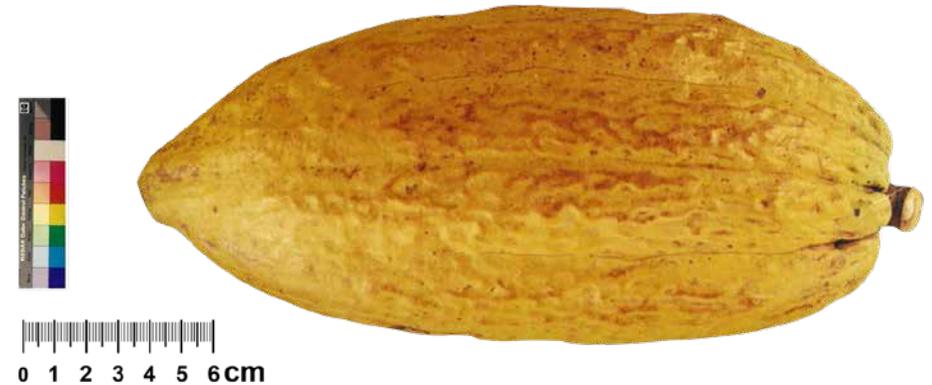
Bean shape: Ovate
Cotyledon colour: Medium purple (few dark purple or light purple)
Bean number: 52 (5)
Cotyledon mass (g): 0.83 (0.13)
Cotyledon length (cm): 2.23 (0.25)
Cotyledon width (cm): 1.13 (0.07)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

IMC 67



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Oblong (some elliptic)
Pod apex form: Obtuse
Pod basal constriction: Intermediate
Pod surface texture: Intermediate wartiness
Ridges: Equidistant with wide separation of ridge pairs
Pod length (cm): 19.9 (2.0)
Pod width (cm): 9.8 (1.7)
Pod index: 20.03



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: Intermediate anthocyanin concentration
Pedicel: Reddish
Ovule No: 48 (8)
Ovule No. Maximum: 63
Sepal length (mm): 7.96 (0.58)
Sepal width (mm): 3.00 (0.09)
Ligule width (mm): 2.772 (0.177)
Style length (mm): 2.421 (0.102)



2. Seed / Bean Characteristics

Bean shape: Ovate
Cotyledon colour: Dark purple (some medium purple)
Bean number: 48 (7)
Cotyledon mass (g): 1.04 (0.20)
Cotyledon length (cm): 2.27 (0.19)
Cotyledon width (cm): 1.07 (0.12)



4. Leaf Characteristics

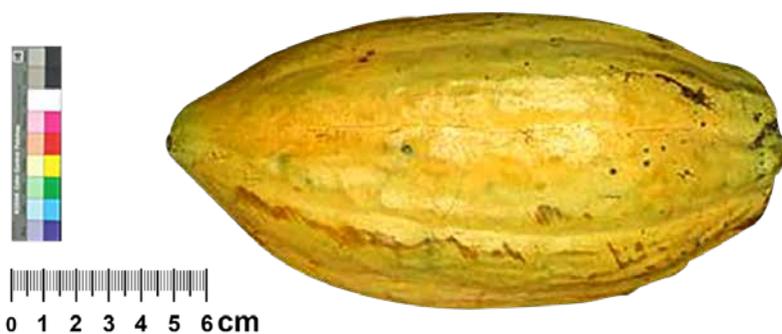
Flush colour: Moderate anthocyanin concentration

5. Notes

Tolerant to Witches' Broom disease, Cocoa Swollen Shoot virus and Ceratocystis wilt



IMC 71



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or oblong
Pod apex form: Acute-indenting or obtuse-indenting
Pod basal constriction: Slight (few intermediate)
Pod surface texture: Slight wartiness
Ridges: Paired with intermediate (some wide) separation of ridge pairs
Pod length (cm): 19.2 (1.5)
Pod width (cm): 9.0 (0.4)
Pod index: 19.41



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: Slight anthocyanin concentration
Pedicle: Reddish
Ovule No: 60 (4)
Ovule No. Maximum: 68
Sepal length (mm): 8.00 (0.47)
Sepal width (mm): 2.80 (0.42)
Ligule width (mm): 2.839 (0.385)
Style length (mm): 2.282 (0.242)



2. Seed / Bean Characteristics

Bean shape: Ovate
Cotyledon colour: Dark purple (some medium purple)
Bean number: 56 (3)
Cotyledon mass (g): 0.92 (0.12)
Cotyledon length (cm): 2.14 (0.16)
Cotyledon width (cm): 1.12 (0.10)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

5. Notes

Butter fat content = 53.5%

IMC 78



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Oblong
Pod apex form: Obtuse or obtuse-indenting
Pod basal constriction: Slight
Pod surface texture: Slight wartiness or smooth
Ridges: Paired with intermediate (some wide) separation of ridge pairs
Pod length (cm): 16.6 (1.9)
Pod width (cm): 8.4 (0.9)
Pod index: 23.29



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: Slight anthocyanin concentration
Pedicle: Reddish
Ovule No: 49 (6)
Ovule No. Maximum: 59
Sepal length (mm): 6.78 (0.48)
Sepal width (mm): 2.35 (0.16)
Ligule width (mm): 2.21 (0.26)
Style length (mm): 2.05 (0.24)



2. Seed / Bean Characteristics

Bean shape: Oblong (some elliptic)
Cotyledon colour: Dark purple or medium purple
Bean number: 53 (5)
Cotyledon mass (g): 0.81 (0.21)
Cotyledon length (cm): 2.16 (0.34)
Cotyledon width (cm): 1.07 (0.09)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration





1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic (short)
Pod apex form: Indented or obtuse-indent
Pod basal constriction: Slight (few intermediate)
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with wide (some intermediate) separation of ridge pairs
Pod length (cm): 14.4 (1.1)
Pod width (cm): 8.9 (0.9)
Pod index: 25.25



2. Seed / Bean Characteristics

Bean shape: Oblong
Cotyledon colour: Medium purple (few dark purple or light purple)
Bean number: 44 (8)
Cotyledon mass (g): 0.90 (0.24)
Cotyledon length (cm): 2.21 (0.43)
Cotyledon width (cm): 1.14 (0.10)



3. Flower Characteristics

Ligule: Intermediate anthocyanin concentration
Filament: Intense or intermediate anthocyanin concentration
Pedicel: Reddish
Ovule No: 53 (6)
Ovule No. Maximum: 61
Sepal length (mm): 7.05 (0.16)
Sepal width (mm): 2.24 (0.21)
Ligule width (mm): 2.67 (0.21)
Style length (mm): 2.26 (0.21)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or oblong
Pod apex form: Indented or rounded
Pod basal constriction: Intermediate or slight
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate (some wide) separation of ridge pairs
Pod length (cm): 16.5 (2.1)
Pod width (cm): 9.1 (0.9)
Pod index: 23.12



2. Seed / Bean Characteristics

Bean shape: Ovate (some elliptic)
Cotyledon colour: Dark purple (some medium purple)
Bean number: 42 (5)
Cotyledon mass (g): 1.03 (0.25)
Cotyledon length (cm): 2.27 (0.29)
Cotyledon width (cm): 1.17 (0.18)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: Intense or intermediate anthocyanin concentration
Pedicel: Red
Ovule No: 47 (1)
Ovule No. Maximum: 49
Sepal length (mm): 8.32 (0.29)
Sepal width (mm): 2.13 (0.16)
Ligule width (mm): 2.65 (0.20)
Style length (mm): 2.89 (0.16)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration





0 1 2 3 4 5 6 cm



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse-indent
Pod basal constriction: Intermediate or slight
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 18.4 (1.5)
Pod width (cm): 8.8 (0.9)
Pod index: 19.70



2. Seed / Bean Characteristics

Bean shape: Ovate
Cotyledon colour: Medium purple (some dark purple)
Bean number: 47 (4)
Cotyledon mass (g): 1.08 (0.14)
Cotyledon length (cm): 2.25 (0.13)
Cotyledon width (cm): 1.21 (0.08)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: Slight anthocyanin concentration
Pedicel: Reddish or green
Ovule No: 42 (3)
Sepal length (mm): 8.86 (0.30)
Sepal width (mm): 2.27 (0.26)
Ligule width (mm): 2.970 (0.170)
Style length (mm): 2.869 (0.160)

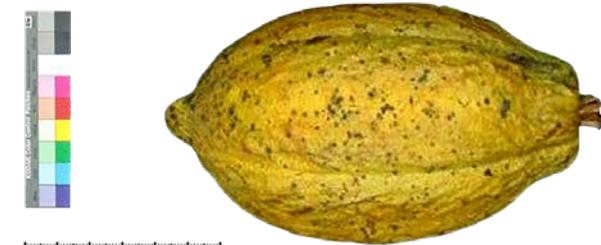


4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration

5. Notes

Butter fat content = 52.4%



0 1 2 3 4 5 6 cm



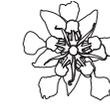
1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Mammillate
Pod basal constriction: Intermediate
Pod surface texture: Intermediate wartiness
Ridges: Paired with wide (some intermediate or slight) separation of ridge pairs
Pod length (cm): 16.3 (1.0)
Pod width (cm): 8.8 (0.7)
Pod index: 21.73



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Medium purple (some dark purple)
Bean number: 43 (4)
Cotyledon mass (g): 1.07 (0.19)
Cotyledon length (cm): 2.24 (0.19)
Cotyledon width (cm): 1.24 (0.10)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: No anthocyanin
Pedicel: Red, reddish or green
Ovule No: 41 (6)
Ovule No. Maximum: 53
Sepal length (mm): 8.20 (0.32)
Sepal width (mm): 2.08 (0.16)
Ligule width (mm): 2.450 (0.429)
Style length (mm): 2.042 (0.157)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration



LCT EEN 162/S-1010



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse-indentured (some acute-indentured)
Pod basal constriction: Slight (few intermediate)
Pod surface texture: Intermediate wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 15.3 (1.1)
Pod width (cm): 8.2 (0.6)
Pod index: 25.88



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Dark purple (some medium purple)
Bean number: 42 (10)
Cotyledon mass (g): 0.92 (0.14)
Cotyledon length (cm): 2.15 (0.10)
Cotyledon width (cm): 1.21 (0.06)



3. Flower Characteristics

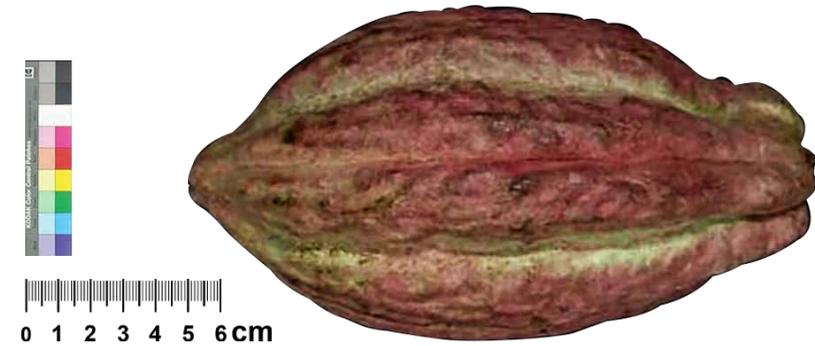
Ligule: Slight anthocyanin concentration
Filament: Intermediate or slight anthocyanin concentration
Pedicle: Reddish
Ovule No: 45 (3)
Ovule No. Maximum: 49
Sepal length (mm): 6.34 (0.34)
Sepal width (mm): 2.35 (0.28)
Ligule width (mm): 2.173 (0.127)
Style length (mm): 2.245 (0.103)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

LCT EEN 212/S-4



1. Fruit Characteristics

Colour of mature pod: Intermediate anthocyanin concentration
Pod shape: Elliptic
Pod apex form: Mammillate (few short obtuse)
Pod basal constriction: Strong or intermediate (few tending to wide-shouldered)
Pod surface texture: Intermediate wartiness (some slight)
Ridges: Paired with slight (some intermediate) separation of ridge pairs
Pod length (cm): 15.9 (2.1)
Pod width (cm): 8.8 (0.9)
Pod index: 25.51



2. Seed / Bean Characteristics

Bean shape: Elliptic (some oblong)
Cotyledon colour: Dark purple (some white, light purple, medium purple or mottled)
Bean number: 40 (5)



Cotyledon mass (g): 0.98 (0.16)
Cotyledon length (cm): 2.17 (0.16)
Cotyledon width (cm): 1.22 (0.07)

3. Flower Characteristics

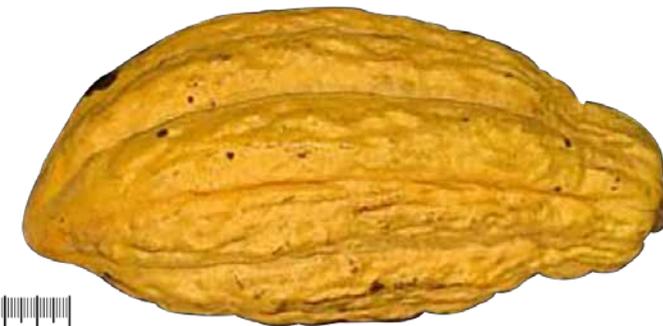
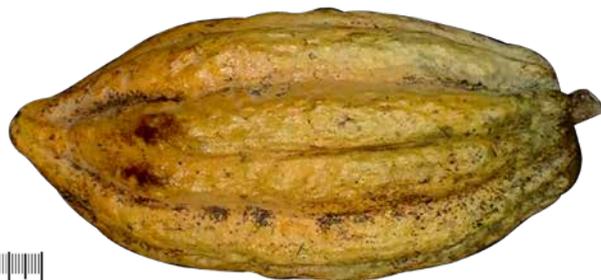
Ligule: No anthocyanin
Filament: No anthocyanin
Pedicle: Red or reddish
Ovule No: 45 (3)
Ovule No. Maximum: 51
Sepal length (mm): 7.60 (0.24)
Sepal width (mm): 2.57 (0.23)
Ligule width (mm): 2.64 (0.12)
Style length (mm): 2.56 (0.15)



4. Leaf Characteristics

Flush colour: Intense anthocyanin concentration





1. Fruit Characteristics

Colour of mature pod: Yellow

Pod shape: Elliptic or oblong

Pod apex form: Obtuse-indented (some with curved apex)

Pod basal constriction: Slight (some intermediate)

Pod surface texture: Intense or intermediate wartiness

Ridges: Paired with intermediate (some slight) separation of ridge pairs; prominent ridges

Pod length (cm): 18.3 (1.2)

Pod width (cm): 10.0 (0.5)

Pod index: 16.49



3. Flower Characteristics

Ligule: No anthocyanin

Filament: No anthocyanin

Pedicel: Red or reddish

Ovule No: 43 (4)

Ovule No. Maximum: 50

Sepal length (mm): 8.30 (0.70)

Sepal width (mm): 2.51 (0.26)

Ligule width (mm): 2.72 (0.29)

Style length (mm): 2.46 (0.11)



2. Seed / Bean Characteristics

Bean shape: Elliptic (some oblong)

Cotyledon colour: Dark purple (some medium purple)

Bean number: 43 (3)

Cotyledon mass (g): 1.41 (0.11)

Cotyledon length (cm): 2.58 (0.17)

Cotyledon width (cm): 1.33 (0.07)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration



1. Fruit Characteristics

Colour of mature pod: Yellow

Pod shape: Elliptic

Pod apex form: Acute (some blunt-nosed, few attenuate)

Pod basal constriction: Strong (few tending to wide-shouldered)

Pod surface texture: Intermediate wartiness

Ridges: Paired with intermediate separation of ridge pairs

Pod length (cm): 18.0 (1.2)

Pod width (cm): 9.0 (0.2)

Pod index: 24.37



2. Seed / Bean Characteristics

Bean shape: Ovate (some elliptic)

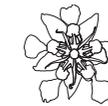
Cotyledon colour: Medium purple (some light purple)

Bean number: 36 (3)

Cotyledon mass (g): 1.14 (0.18)

Cotyledon length (cm): 2.32 (0.09)

Cotyledon width (cm): 1.38 (0.07)



3. Flower Characteristics

Ligule: No anthocyanin

Filament: Intermediate or slight anthocyanin concentration

Pedicel: Red or reddish

Ovule No: 40 (2)

Ovule No. Maximum: 43

Sepal length (mm): 8.01 (0.36)

Sepal width (mm): 2.02 (0.11)

Ligule width (mm): 2.55 (0.32)

Style length (mm): 2.59 (0.34)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

5. Notes

Good Black Pod disease tolerance.



LP 4/8



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or obovate
Pod apex form: Indented
Pod basal constriction: Strong
Pod surface texture: Intense wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 17.2 (1.9)
Pod width (cm): 8.9 (0.7)
Pod index: 25.25



3. Flower Characteristics

Ligule: Intermediate anthocyanin concentration
Filament: Intermediate anthocyanin concentration
Pedicel: Red
Ovule No: 40 (3)
Ovule No. Maximum: 45
Sepal length (mm): 8.42 (0.38)
Sepal width (mm): 1.97 (0.16)
Ligule width (mm): 2.44 (0.26)
Style length (mm): 2.26 (0.19)



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Medium purple (some light purple)
Bean number: 36 (2)
Cotyledon mass (g): 1.10 (0.21)
Cotyledon length (cm): 2.09 (0.15)
Cotyledon width (cm): 1.24 (0.11)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration

5. Notes

Good Black Pod disease tolerance.

LX 31



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic (short)
Pod apex form: Obtuse (few blunt acute)
Pod basal constriction: Slight
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 15.5 (1.2)
Pod width (cm): 7.9 (0.7)
Pod index: 26.46



3. Flower Characteristics

Ligule: Intermediate or slight anthocyanin concentration
Filament: Slight anthocyanin concentration
Pedicel: Red or reddish
Ovule No: 46 (2)
Ovule No. Maximum: 49
Sepal length (mm): 6.67 (0.32)
Sepal width (mm): 1.89 (0.20)
Ligule width (mm): 1.97 (0.17)
Style length (mm): 1.95 (0.11)



2. Seed / Bean Characteristics

Bean shape: Elliptic (some ovate)
Cotyledon colour: Medium purple (some dark purple)
Bean number: 42 (6)
Cotyledon mass (g): 0.90 (0.14)
Cotyledon length (cm): 2.13 (0.14)
Cotyledon width (cm): 1.22 (0.10)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration



MAN 15/2



MATINA 1/7



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Oblong or elliptic
Pod apex form: Acute (blunt-nosed, some long obtuse-indented)
Pod basal constriction: Intermediate or slight
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 18.7 (2.3)
Pod width (cm): 7.9 (0.8)
Pod index: 26.80



3. Flower Characteristics

Ligule: Intermediate anthocyanin concentration
Filament: Intermediate anthocyanin concentration
Pedice: Red
Ovule No: 54 (4)
Ovule No. Maximum: 60
Sepal length (mm): 8.12 (0.55)
Sepal width (mm): 2.50 (0.26)
Ligule width (mm): 3.04 (0.24)
Style length (mm): 2.07 (0.16)



2. Seed / Bean Characteristics

Bean shape: Oblong (some elliptic or ovate)
Cotyledon colour: Dark purple (some medium purple)
Bean number: 41 (12)
Cotyledon mass (g): 0.91 (0.16)
Cotyledon length (cm): 2.15 (0.22)
Cotyledon width (cm): 1.10 (0.08)



4. Leaf Characteristics

Flush colour: Intense anthocyanin concentration



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Acute (some acute-indented)
Pod basal constriction: Intermediate or slight
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with slight separation of ridge pairs
Pod length (cm): 15.4 (2.9)
Pod width (cm): 8.4 (1.1)
Pod index: 19.03



3. Flower Characteristics

Ligule: No anthocyanin
Filament: No anthocyanin
Pedice: Reddish
Ovule No: 46 (3)
Ovule No. Maximum: 52
Sepal length (mm): 7.70 (0.54)
Sepal width (mm): 2.20 (0.13)
Ligule width (mm): 2.58 (0.25)
Style length (mm): 1.78 (0.16)



2. Seed / Bean Characteristics

Bean shape: Ovate (few elliptic)
Cotyledon colour: Medium purple (few dark purple or light purple)
Bean number: 36 (10)
Cotyledon mass (g): 1.46 (0.31)
Cotyledon length (cm): 2.65 (0.34)
Cotyledon width (cm): 1.47 (0.10)



4. Leaf Characteristics

Flush colour: Intense anthocyanin concentration

5. Notes

Butter fat content = 54.9%



MOQ 6/19



NA 70



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or oblong
Pod apex form: Obtuse-indented (some acute-indented)
Pod basal constriction: Strong or intermediate
Pod surface texture: Intense or intermediate wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 19.1 (1.5)
Pod width (cm): 8.6 (0.6)
Pod index: 17.12



3. Flower Characteristics

Ligule: No anthocyanin
Filament: Slight anthocyanin concentration (some with no anthocyanin)
Pedicel: Red or reddish
Ovule No: 45 (3)
Ovule No. Maximum: 49
Sepal length (mm): 7.55 (0.36)
Sepal width (mm): 2.09 (0.14)
Ligule width (mm): 2.24 (0.12)
Style length (mm): 2.36 (0.11)



2. Seed / Bean Characteristics

Bean shape: Elliptic (some oblong)
Cotyledon colour: Dark purple
Bean number: 46 (8)
Cotyledon mass (g): 1.27 (0.22)
Cotyledon length (cm): 2.34 (0.19)
Cotyledon width (cm): 1.38 (0.04)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration

5. Notes

Moderate Black Pod disease tolerance.



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or oblong
Pod apex form: Obtuse
Pod basal constriction: Slight
Pod surface texture: Slight wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 15.7 (1.4)
Pod width (cm): 7.3 (0.7)
Pod index: 24.74



3. Flower Characteristics

Ligule: Intense, intermediate or slight anthocyanin concentration (some with no anthocyanin)
Filament: Intense or intermediate anthocyanin concentration
Pedicel: Reddish or green
Ovule No: 46 (4)
Ovule No. Maximum: 55
Sepal length (mm): 6.83 (0.43)
Sepal width (mm): 2.15 (0.18)
Ligule width (mm): 2.58 (0.25)
Style length (mm): 2.58 (0.25)



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Dark purple (some medium purple)
Bean number: 47 (5)
Cotyledon mass (g): 0.86 (0.12)
Cotyledon length (cm): 2.14 (0.13)
Cotyledon width (cm): 1.25 (0.07)



4. Leaf Characteristics

Flush colour: No anthocyanin



NA 232



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse-indent
Pod basal constriction: Slight
Pod surface texture: Intermediate wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 17.4 (1.4)
Pod width (cm): 8.3 (0.6)
Pod index: 23.10



3. Flower Characteristics

Ligule: Intermediate or slight anthocyanin concentration
Filament: Intense or intermediate anthocyanin concentration
Pedicel: Red or reddish
Ovule No: 44 (4)
Ovule No. Maximum: 53
Sepal length (mm): 6.29 (0.35)
Sepal width (mm): 2.23 (0.18)
Ligule width (mm): 2.07 (0.22)
Style length (mm): 1.94 (0.19)



2. Seed / Bean Characteristics

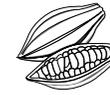
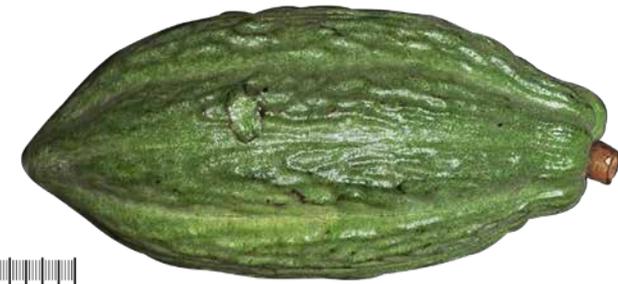
Bean shape: Elliptic
Cotyledon colour: Dark purple (some medium purple)
Bean number: 39 (11)
Cotyledon mass (g): 1.11 (0.10)
Cotyledon length (cm): 2.20 (0.24)
Cotyledon width (cm): 1.23 (0.06)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

PA 4



1. Fruit Characteristics

Colour of mature pod: Yellow (unripe pod is distinctively dark green / bottle-green)
Pod shape: Elliptic
Pod apex form: Mammillate
Pod basal constriction: Strong
Pod surface texture: Intermediate wartiness
Ridges: Paired with wide separation of ridge pairs
Pod length (cm): 17.1 (1.5)
Pod width (cm): 8.0 (0.4)
Pod index: 24.05



3. Flower Characteristics

Ligule: Intermediate or slight anthocyanin concentration
Filament: No anthocyanin
Pedicel: Reddish or green
Ovule No: 43 (2)
Ovule No. Maximum: 49
Sepal length (mm): 6.07 (0.39)
Sepal width (mm): 2.09 (0.18)
Ligule width (mm): 2.32 (0.14)
Style length (mm): 2.08 (0.15)



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Medium purple (few light purple)
Bean number: 42 (4)
Cotyledon mass (g): 0.99 (0.11)
Cotyledon length (cm): 2.12 (0.11)
Cotyledon width (cm): 1.25 (0.07)



4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration

5. Notes

Good Black Pod disease tolerance.



PA 67



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Acute (blunt)
Pod basal constriction: Strong or intermediate
Pod surface texture: Slight wartiness
Ridges: Paired with intermediate (some wide) separation of ridge pairs
Pod length (cm): 16.2 (2.6)
Pod width (cm): 7.6 (0.8)
Pod index: 25.26



2. Seed / Bean Characteristics

Bean shape: Elliptic (some oblong)
Cotyledon colour: Medium purple (some dark purple)
Bean number: 37 (14)
Cotyledon mass (g): 1.07 (0.24)
Cotyledon length (cm): 2.30 (0.16)
Cotyledon width (cm): 1.20 (0.14)



3. Flower Characteristics

Ligule: Intermediate or slight anthocyanin concentration
Filament: Intermediate anthocyanin concentration
Pedicle: Red or reddish
Ovule No: 45 (6)
Ovule No. Maximum: 57
Sepal length (mm): 7.25 (0.43)
Sepal width (mm): 2.26 (0.16)
Ligule width (mm): 2.59 (0.17)
Style length (mm): 2.11 (0.28)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

PA 71



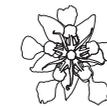
1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Acute (blunt)
Pod basal constriction: Intermediate (few strong)
Pod surface texture: Slight wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 19.4 (1.2)
Pod width (cm): 8.5 (0.6)
Pod index: 19.54



2. Seed / Bean Characteristics

Bean shape: Ovate
Cotyledon colour: Dark purple (some medium purple)
Bean number: 43 (10)
Cotyledon mass (g): 1.19 (0.17)
Cotyledon length (cm): 2.40 (0.18)
Cotyledon width (cm): 1.20 (0.06)



3. Flower Characteristics

Ligule: No anthocyanin
Filament: No anthocyanin
Pedicle: Reddish or green
Ovule No: 48 (4)
Ovule No. Maximum: 54
Sepal length (mm): 7.50 (0.36)
Sepal width (mm): 2.43 (0.18)
Ligule width (mm): 2.39 (0.15)
Style length (mm): 2.61 (0.21)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

5. Notes

Very high Black Pod disease tolerance.



PA 150



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Attenuate or acute
Pod basal constriction: Wide-shouldered or strong
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 17.4 (1.3)
Pod width (cm): 7.8 (0.7)
Pod index: 27.36



2. Seed / Bean Characteristics

Bean shape: Elliptic (some oblong)
Cotyledon colour: Dark purple
Bean number: 43 (8)
Cotyledon mass (g): 0.85 (0.17)
Cotyledon length (cm): 2.02 (0.25)
Cotyledon width (cm): 1.10 (0.13)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: Slight anthocyanin concentration
Pedicle: Reddish
Ovule No: 47 (3)
Ovule No. Maximum: 51
Sepal length (mm): 6.86 (0.37)
Sepal width (mm): 2.10 (0.11)
Ligule width (mm): 2.69 (0.18)
Style length (mm): 2.29 (0.10)



4. Leaf Characteristics

Flush colour: No anthocyanin

5. Notes

Widely used in breeding

PA 169



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse (some almost blunt-nosed acute)
Pod basal constriction: Intermediate or strong
Pod surface texture: Intermediate wartiness (few intense or slight)
Ridges: Paired with intermediate (some wide) separation of ridge pairs
Pod length (cm): 16.0 (1.1)
Pod width (cm): 7.9 (0.5)
Pod index: 29.12



2. Seed / Bean Characteristics

Bean shape: Elliptic (some oblong)
Cotyledon colour: Medium purple (some dark purple)
Bean number: 34 (8)
Cotyledon mass (g): 1.01 (0.15)
Cotyledon length (cm): 2.09 (0.14)
Cotyledon width (cm): 1.20 (0.15)



3. Flower Characteristics

Ligule: No anthocyanin concentration
Filament: Slight anthocyanin concentration
Pedicle: Reddish
Ovule No: 40 (4)
Ovule No. Maximum: 49
Sepal length (mm): 6.25 (0.33)
Sepal width (mm): 2.62 (0.15)
Ligule width (mm): 2.54 (0.08)
Style length (mm): 2.50 (0.17)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

5. Notes

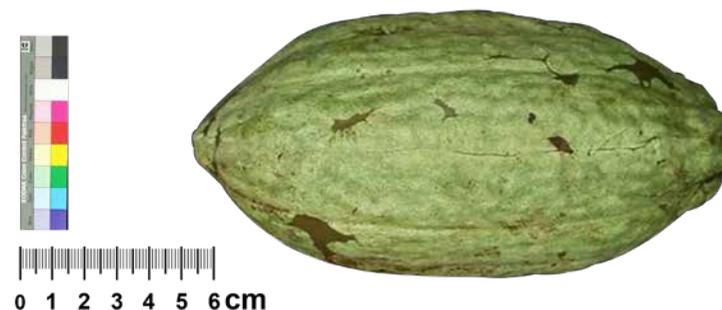
Good Frosty Pod disease tolerance (Costa Rica)



PLAYA ALTA 2



POUND 16/B



1. Fruit Characteristics

Colour of mature pod: Yellow or slight anthocyanin concentration on ridges
Pod shape: Elliptic
Pod apex form: Acute or attenuate (blunt)
Pod basal constriction: Strong
Pod surface texture: Intermediate or slight wartiness
Ridges: Paired with wide separation of ridge pairs
Pod length (cm): 17.7 (1.3)
Pod width (cm): 8.4 (0.5)
Pod index: 22.05



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Light purple or medium purple (some dark purple or gray)
Bean number: 36 (5)
Cotyledon mass (g): 1.26 (0.22)
Cotyledon length (cm): 2.39 (0.19)
Cotyledon width (cm): 1.31 (0.11)



3. Flower Characteristics

Ligule: No anthocyanin
Filament: No anthocyanin
Pedicle: Reddish
Ovule No: 48 (5)
Ovule No. Maximum: 57
Sepal length (mm): 7.50 (0.53)
Sepal width (mm): 2.04 (0.31)
Ligule width (mm): 2.24 (0.42)
Style length (mm): 2.02 (0.32)



4. Leaf Characteristics

Flush colour: Low anthocyanin concentration

5. Notes

Strong Criollo ancestry



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Attenuate or acute
Pod basal constriction: Strong
Pod surface texture: Slight wartiness
Ridges: Paired with intermediate separation of ridge pairs
Pod length (cm): 15.7 (1.5)
Pod width (cm): 7.5 (0.7)
Pod index: 24.30



2. Seed / Bean Characteristics

Bean shape: Elliptic (some oblong)
Cotyledon colour: Medium purple or dark purple (few light purple)
Bean number: 49 (6)
Cotyledon mass (g): 0.84 (0.17)
Cotyledon length (cm): 2.18 (0.23)
Cotyledon width (cm): 1.13 (0.14)



3. Flower Characteristics

Ligule: Intermediate or slight anthocyanin concentration
Filament: Intermediate anthocyanin concentration
Pedicle: Red or reddish
Ovule No: 57 (2)
Ovule No. Maximum: 59
Sepal length (mm): 5.79 (0.50)
Sepal width (mm): 2.00 (0.15)
Ligule width (mm): 2.53 (0.29)
Style length (mm): 1.74 (0.27)



4. Leaf Characteristics

Flush colour: No anthocyanin



SCA 6



0 1 2 3 4 5 6 cm



1. Fruit Characteristics

Colour of mature pod: Yellow (unripe pod is distinctively dark green / bottle-green)

Pod shape: Oblong or elliptic

Pod apex form: Attenuate or acute (distinct blunt-nosed resembling a snout)

Pod basal constriction: Intermediate or slight

Pod surface texture: Slight or intermediate wartiness

Ridges: Paired with intermediate separation of ridge pairs

Pod length (cm): 15.7 (1.6)

Pod width (cm): 6.4 (0.4)

Pod index: 43.57



2. Seed / Bean Characteristics

Bean shape: Oblong

Cotyledon colour: Medium purple (some dark purple)

Bean number: 45 (6)

Cotyledon mass (g): 0.51 (0.11)

Cotyledon length (cm): 1.75 (0.10)

Cotyledon width (cm): 0.88 (0.09)



3. Flower Characteristics

Ligule: No anthocyanin

Filament: No anthocyanin

Pedicel: Green

Ovule No: 42 (6)

Ovule No. Maximum: 58

Sepal length (mm): 7.90 (0.44)

Sepal width (mm): 2.62 (0.33)

Ligule width (mm): 2.27 (0.31)

Style length (mm): 2.03 (0.40)



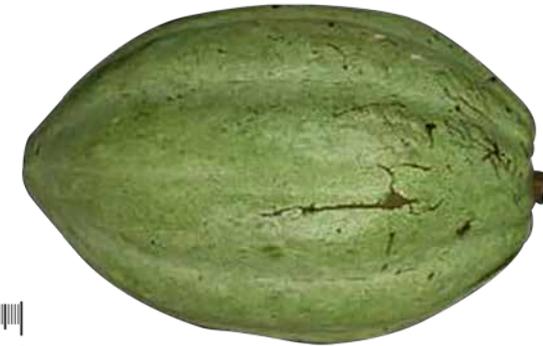
4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration

5. Notes

Good Witches' Broom tolerance, produces many pods

SIAL 339



0 1 2 3 4 5 6 cm



1. Fruit Characteristics

Colour of mature pod: Yellow

Pod shape: Oblong (some elliptic or orbicular)

Pod apex form: Obtuse (some almost mammillate)

Pod basal constriction: Slight

Pod surface texture: Slight wartiness

Ridges: Paired with wide (some intermediate) separation of ridge pairs

Pod length (cm): 14.2 (1.2)

Pod width (cm): 8.8 (0.6)

Pod index: 22.15



2. Seed / Bean Characteristics

Bean shape: Oblong (some elliptic or ovate)

Cotyledon colour: Dark purple

Bean number: 43 (7)

Cotyledon mass (g): 1.05 (0.23)

Cotyledon length (cm): 2.15 (0.25)

Cotyledon width (cm): 1.26 (0.09)



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)

Filament: Slight anthocyanin concentration

Pedicel: Reddish

Ovule No: 52 (3)

Ovule No. Maximum: 56

Sepal length (mm): 7.45 (0.30)

Sepal width (mm): 2.28 (0.11)

Ligule width (mm): 2.39 (0.15)

Style length (mm): 2.56 (0.06)



4. Leaf Characteristics

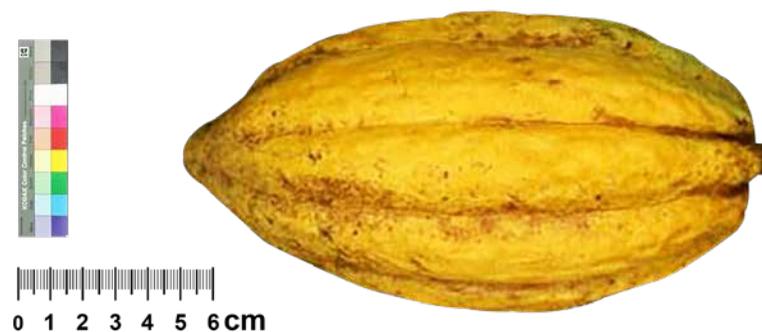
Flush colour: No anthocyanin



SPA 7



TRD 32



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse or obtuse-indent (some blunt acute-indent)
Pod basal constriction: Slight
Pod surface texture: Slight wartiness (some intermediate)
Ridges: Paired with intermediate or wide separation of ridge pairs
Pod length (cm): 15.9 (1.0)
Pod width (cm): 8.0 (0.5)
Pod index: 26.93



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: Slight anthocyanin concentration
Pedicel: Green
Ovule No. Maximum: 48
Sepal length (mm): 8.43 (0.55)
Sepal width (mm): 2.41 (0.29)
Ligule width (mm): 3.17 (0.31)
Style length (mm): 2.10 (0.31)



2. Seed / Bean Characteristics

Bean shape: Elliptic (few ovate)
Cotyledon colour: Medium purple (some light purple)
Bean number: 47 (3)
Cotyledon mass (g): 0.79 (0.19)
Cotyledon length (cm): 2.14 (0.19)
Cotyledon width (cm): 1.24 (0.05)



4. Leaf Characteristics

Flush colour: No anthocyanin



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic
Pod apex form: Obtuse-indent (some acute-indent)
Pod basal constriction: Intermediate or slight
Pod surface texture: Intermediate wartiness (few slight)
Ridges: Paired with intermediate (some slight) separation of ridge pairs
Pod length (cm): 16.1 (7.8)
Pod width (cm): 8.0 (0.9)
Pod index: 24.98



3. Flower Characteristics

Ligule: Slight anthocyanin concentration
Filament: Intense or intermediate anthocyanin concentration
Pedicel: Reddish or green
Ovule No. Maximum: 52 (4)
Sepal length (mm): 7.36 (0.42)
Sepal width (mm): 0.47 (0.99)
Ligule width (mm): 2.56 (0.18)
Style length (mm): 2.33 (0.20)



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Dark purple
Bean number: 44 (10)
Cotyledon mass (g): 0.91 (0.18)
Cotyledon length (cm): 2.15 (0.11)
Cotyledon width (cm): 1.15 (0.10)

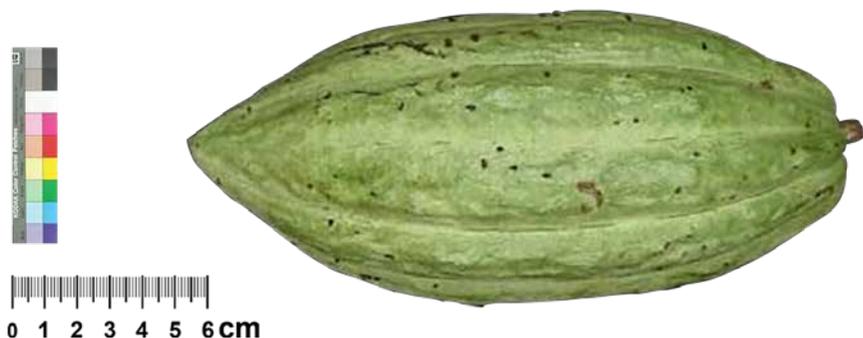


4. Leaf Characteristics

Flush colour: Moderate anthocyanin concentration



TRD 44



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic or oblong
Pod apex form: Acute (few obtuse)
Pod basal constriction: Intermediate or slight
Pod surface texture: Slight wartiness (few intermediate)
Ridges: Paired with wide (some intermediate) separation of ridge pairs
Pod length (cm): 17.1 (2.5)
Pod width (cm): 7.8 (1.0)
Pod index: 20.76



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: Slight anthocyanin concentration
Pedicel: Red or reddish
Ovule No: 46 (4)
Ovule No. Maximum: 54
Sepal length (mm): 7.45 (0.35)
Sepal width (mm): 2.42 (0.18)
Ligule width (mm): 2.01 (0.12)
Style length (mm): 2.54 (0.16)



2. Seed / Bean Characteristics

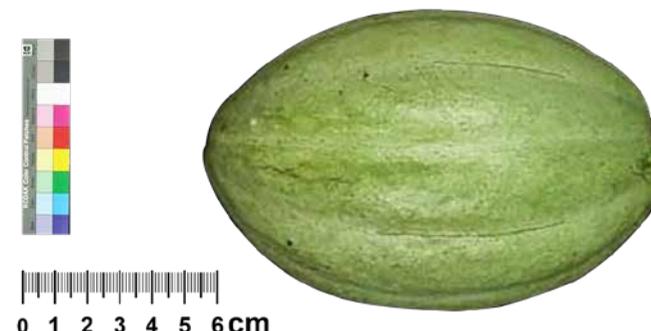
Bean shape: Oblong (few elliptic)
Cotyledon colour: Medium purple (some light purple, few dark purple)
Bean number: 43 (4)
Cotyledon mass (g): 1.12 (0.17)
Cotyledon length (cm): 2.17 (0.30)
Cotyledon width (cm): 1.14 (0.14)



4. Leaf Characteristics

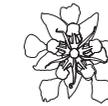
Flush colour: Low anthocyanin concentration

TRD 109



1. Fruit Characteristics

Colour of mature pod: Yellow
Pod shape: Elliptic (some orbicular)
Pod apex form: Indented
Pod basal constriction: Absent or slight
Pod surface texture: Slight wartiness or smooth
Ridges: Paired with wide separation of ridge pairs
Pod length (cm): 14.2 (0.7)
Pod width (cm): 9.2 (0.5)
Pod index: 20.89



3. Flower Characteristics

Ligule: Slight anthocyanin concentration (some with no anthocyanin)
Filament: Slight anthocyanin concentration (some with no anthocyanin)
Pedicel: Red or reddish
Ovule No: 43 (3)
Ovule No. Maximum: 46
Sepal length (mm): 8.69 (0.68)
Sepal width (mm): 2.39 (0.16)
Ligule width (mm): 2.79 (0.36)
Style length (mm): 2.24 (0.20)



2. Seed / Bean Characteristics

Bean shape: Elliptic
Cotyledon colour: Medium purple (some dark purple)
Bean number: 42 (4)
Cotyledon mass (g): 1.14 (0.12)
Cotyledon length (cm): 2.46 (0.22)
Cotyledon width (cm): 1.32 (0.11)



4. Leaf Characteristics

Flush colour: Intense anthocyanin concentration





Cocoa
Research
Centre



INITIATIVE ON
Nature-Positive
Solutions

mocca



TechnoServe
Soluciones Empresariales para la Pobreza



LUTHERAN
WORLD RELIEF