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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

CASSAVA

UPOV Code: MANIH_ESC

(*Manihot esculenta* Crantz.)

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from Brazil and Kenya

to be considered by the

Technical Working Party for Vegetables
at its forty-seventh session, to be held in Nagasaki, Japan, from May 20 to 24, 2013

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Manihot esculenta Crantz	Cassava	Manioc	Maniok	Mandioca, Yuca

The purpose of these guidelines ("Test Guidelines") is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

ASSOCIATED DOCUMENTS

These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents.

* These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Manihot esculenta* Crantz.

In the case of ornamental varieties, it may, in particular, be necessary to use additional characteristics to those included in the Table of Characteristics in order to examine Distinctness, Uniformity and Stability.

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of cuttings.

2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:

30 cuttings, each one with a length of 20cm with 5 to 8 buds.

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.5 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination

3.1 Number of Growing Cycles

The minimum duration of tests should normally be a single growing cycle.

3.2 Testing Place

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 “Examining Distinctness”.

3.3 Conditions for Conducting the Examination

The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 20 plants, which should be divided between two or more replicates.

3.4.2 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.5 Additional Tests

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 Distinctness

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines.

4.1.2 Consistent Differences

The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

4.1.3 Clear Differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.1.4 Number of Plants / Parts of Plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 10 plants or parts taken from each of 10 plants and any other observations made on all plants in the test, disregarding any off-type plants.

4.1.5 Method of Observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the second column of the Table of Characteristics (see document TGP/9 “Examining Distinctness”, Section 4 “Observation of characteristics”):

MG: single measurement of a group of plants or parts of plants
MS: measurement of a number of individual plants or parts of plants
VG: visual assessment by a single observation of a group of plants or parts of plants
VS: visual assessment by observation of individual plants or parts of plants

Type of observation: visual (V) or measurement (M)

“Visual” observation (V) is an observation made on the basis of the expert’s judgment. For the purposes of this document, “visual” observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, “G” provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness.

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2.

4.2 Uniformity

4.2.1 It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

4.2.2 For the assessment of uniformity of clones, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 20 plants, 1 off-type is allowed.

4.3 Stability

4.3.1 In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.

4.3.2 Where appropriate, or in cases of doubt, stability may be further examined by testing a new seed stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.

5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics:

(a) Apical leaf: pubescence (characteristic 2)
(b) Leaf: predominant shape of central lobe (characteristic 3)
~~(c) Petiole: color (characteristic 4)~~
(d) Leaf: variegation (characteristic 6)
~~(e) Petiole: attitude in relation to stem (characteristic 10)~~
~~(f) Branching habit (characteristic 15)~~
(g) Stem: color of cortex (characteristic 16)
(h) Stem: growth habit (characteristic 19)
~~(i) Stem: color of end branches (at top 20 cm of plant) (characteristic 22)~~
(j) Root: color of flesh (characteristic 27)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 “Examining Distinctness”.

6. Introduction to the Table of Characteristics

6.1 Categories of Characteristics

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 States of Expression and Corresponding Notes

6.2.1 States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description.

6.2.2 In the case of qualitative and pseudo-qualitative characteristics (see Chapter 6.3), all relevant states of expression are presented in the characteristic. However, in the case of quantitative characteristics with 5 or more states, an abbreviated scale may be used to minimize the size of the Table of Characteristics. For example, in the case of a quantitative characteristic with 9 states, the presentation of states of expression in the Test Guidelines may be abbreviated as follows:

State	Note
small	3
medium	5
large	7

However, it should be noted that all of the following 9 states of expression exist to describe varieties and should be used as appropriate:

State	Note
very small	1
very small to small	2
small	3
small to medium	4
medium	5
medium to large	6
large	7
large to very large	8
very large	9

6.2.3 Further explanation of the presentation of states of expression and notes is provided in document TGP/7 “Development of Test Guidelines”.

6.3 Types of Expression

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction.

6.4 Example Varieties

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic.

6.5 Legend

(*)	Asterisked characteristic	– see Chapter 6.1.2
QL	Qualitative characteristic	– see Chapter 6.3
QN	Quantitative characteristic	– see Chapter 6.3
PQ	Pseudo-qualitative characteristic	– see Chapter 6.3
MG, MS, VG, VS		– see Chapter 4.1.5
(a)-(c)	See Explanations on the Table of Characteristics in Chapter 8.1	
(+)	See Explanations on the Table of Characteristics in Chapter 8.2.	

7. Table of Characteristics/Tableau des caractères/Merkmalstabelle/Tabla de caracteres

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
1. (*) (+)	**VG**	**Apical leaf: color**					
PQ	**(a)**	light green					1
		dark green				Clone 2005/0034	2
		purplish green				Clone 82/001	3
		purple					4
2. (*) (+)	**VG**	**Apical leaf: pubescence**					
QL	**(a)**	absent				Clone 2005/0034	1
		present				Clone 82/0058	9
3. (*) (+)	**VG**	**Leaf: predominant shape of central lobe**					
PQ	**(b)**	linear					1
		elliptic					2
		obovate					3
4. (*) (+)	**VG**	**Petiole: color**					
PQ	**(b)**	yellowish green				Nzalauka, Shibe, Siri	1
		green				Karibuni	2
		reddish green				Clone 517, Karembo, Tajirika	3
		greenish red					4
		red				Clone 2021, Kibandameno, Nguzo	5
		purple				Clone 1366	6
5.	**VG**	**Leaf: color**					
PQ	**(b)**	light green				Kibandameno, Nguzo	1
		dark green				Example varieties will be provide until TWV	2
		purplish green					3
		purple					4

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
6. (*)	**VG**	**Leaf: variegation**					
QL	**(b)**	absent				Example varieties wil be provide until TWV	1
		present					9
7. (+)	**VG/ MS**	**Leaf: length of central lobe**					
QN	**(b)**	short				Clone 2021	3
		medium				Nzalauka, Siri	5
		long				Kibandameno, Tajirika	7
8. (+)	**VG/ MS**	**Leaf: width of central lobe**					
QN	**(b)**	narrow				Clone 2021	3
		medium				Siri	5
		broad				Kibandameno	7
9. (+)	**VG**	**Leaf: color of veins**				Example varieties will be provide until TWV	
PQ	**(b)**	green				Siri	1
		reddish green				Kibandameno	2
		red					3
		purple					4
10. (*) (+)	**VG**	**Petiole: attitude in relation to stem**					
PQ	**(b)**	semi erect				Karembo, Tajirika	1
		horizontal				Nguzo, Siri	2
		drooping				Clone 1380, Kibandameno	3
		irregular				Nzalauka	4
11. (*) (+)	**VG/ MS**	**Stipule: length**					
QN	**(b)**	short				Karibuni	3
		medium				Karembo, Karibuni	5
		long				Clone 517, Nguzo	7

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
12.	**VG**	**Stipule: margin**					
(+)							
QL	**(b)**	entire					1
		split					2
13.	**VG/ MS**	**Plant: height**					
QN	**(c)**	short					3
		medium					5
		tall				Kibandameno	7
14.	**VG**	**Plant: type**					
(+)							
PQ	**(c)**	compact					1
		open					2
		umbrella					3
		cylindrical					4
15.	**VG**	**Plant: branching habit**					
(+)							
QL	**(c)**	unbranched					1
		branched					2
16.	**VG**	**Stem: color of cortex**					
(+)							
PQ	**(c)**	light green				mfaransa	1
		dark green				B2C20-65	2
		cream					3
		purplish					4

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
17. (*)	**VG**	**Stem: color of exterior**					
PQ	**(c)**	orange					1
		greyish yellow				Kibandameno	2
		greenish yellow				Clone 2021, Siri	3
		brownish yellow				Example varieties will be provide until TWV	4
		light brown				Clone 1380	5
		dark brown				Kiroba	6
		grey				Karibuni, Nguzo	7
18.	**VG**	**Stem: color of epidermis**					
PQ	**(c)**	cream				Karembo, Kibandameno	1
		light brown				Shibe, Tajirika	2
		dark brown					3
		orange					4
		purple					5
19. (*) (+)	**VG**	**Stem: growth habit**					
QL	**(c)**	straight					1
		zigzag					2
20.	**VG**	**Stem: prominence of leaf scars on nodes**					
QN		weak				Kibandameno, Nguzo	3
		medium				Karembo, Karibuni	5
		strong				Example varieties will be provide until TWV	7
21. (+)	**MS**	**Stem: distance between leaf scars ~~on nodes~~**				Example varieties will be provide until TWV	
QN	**(c)**	short					3
		medium					5
		long					7

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
22. (*)	**VG**	**Stem: color of end branches (at top of plant)**					
PQ	**(c)**	green				Karembo, Karibuni	1
		reddish green				Kibandameno	2
		purplish green				Nguzo, Nzalauka	3
		greenish purple				Example varieties will be provide until TWV	4
		purple					5
		red				Clone 2021	6
23.	**VG**	**Root: peduncle**					
(+)							
QL	**(c)**	absent				Clone 1366, Nzalauka	1
		present				Karembo, Nguzo, Tajirika	9
24.	**VG**	**Root: external color of epidermis**					
PQ	**(c)**	whitish				Karembo, Kibandameno, Tajirika	1
		light brown				Karibuni, Nguzo, Siri,	2
		dark brown				Clone 1380	3
25.	**VG**	**Root: texture of epidermis**					
QL	**(c)**	smooth				Clone 2021, Karembo	1
		rough				Nguzo, Nzalauka	2
26.	**VG**	**Root: color of cortex**				Example varieties will be provide until TWV	
PQ	**(c)**	white					1
		cream					2
		yellow					3
		pink					4
		purple					5

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
27.	**VG**	**Root: color of flesh**				Example varieties will be provide until TWV	
PQ	**(c)**	white					1
		cream					2
		light yellow					3
		dark yellow					4
		pink					5
~~**27.**~~	~~**VG**~~	~~**Root: texture of epidermis**~~					
~~**QL**~~	~~**(c)**~~	~~smooth~~				~~Clone 2021, Karembo~~	~~1~~
		~~rough~~				~~Nguzo, Nzalauka~~	~~9~~
28.	**VG**	**Root: shape**					
(+)							
PQ	**(c)**	conical				Karibuni, Nguzo, Nzalauka	1
		conical to cylindrical				Clone 2021, Kibandameno	2
		cylindrical				Clone 1380, Clone 2095	3
		irregular				Shibe, Siri	4
29.	**MS/ MG**	**Root: cyanide content**				Example varieties will be provide until TWV	
(+)							
QN	**(c)**	low					1
		medium					2
		high					3
30.	**VG**	**Root: adherence of cortex to flesh**					
(+)							
QN	**(c)**	weak				Karembo, Karibuni, Kibandameno	3
		medium				Clone 1380, Clone 2021, Nguzo	5
		strong				Clone 1366	7

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

Characteristics containing the following key in the second column of the Table of Characteristics should be examined as indicated below:

(a) Observations should be made after 90 days (3 months) from planting
(b) Observations should be made after 180 days (6-9 months) from planting and at the middle third of the plant unless otherwise specified
(c) Observations should be made after 360 days (12 months) from planting

8.2 Explanations for individual characteristics

Ad. 1: Apical leaf: color

1
light green

2
dark green

3
purplish green

4
purple

Ad. 2: Apical leaf: pubescence

1
absent

9
present

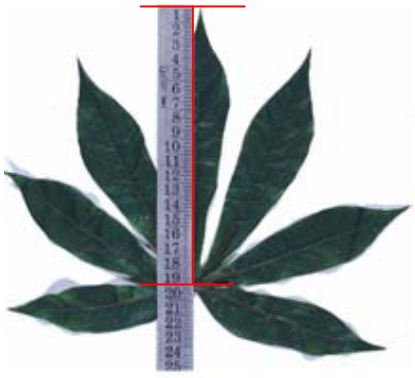
Ad. 3: Leaf: predominent shape of central lobe

1 linear | 2 obovate | 3 elliptic

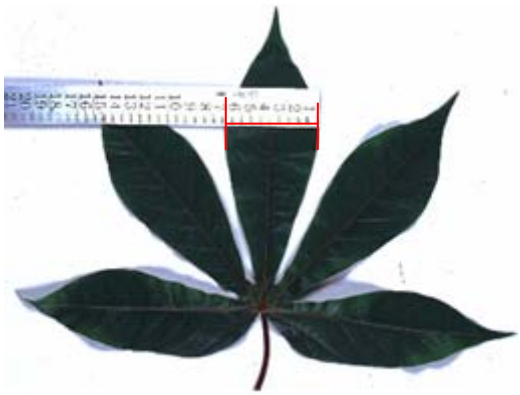
Ad. 4: Petiole: color

1 yellowish green | 2 green | 3 reddish green | 4 greenish red | 5 red | 6 purple

Ad. 7: Leaf: length of central lobe



Ad. 8: Leaf: width of central lobe



Ad. 9: Leaf: color of veins

1
green

2
reddish green

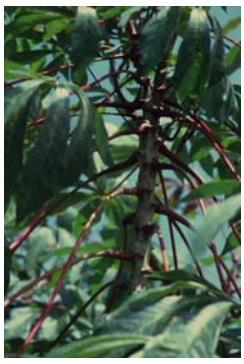
3
red

4
purple

Ad. 10: Petiole: attitude in relation to stem

1
semi erect

2
horizontal



3
drooping

4
irregular

Ad. 11: Stipule: length

To be observed on the upper third of the plant.

3
short

5
medium

7
long

Ad. 12: Stipule: margin

To be observed on the upper third of the plant

1
entire

2
split

Ad. 14: Plant: type

1
compact

2
open

3
umbrella

4
cylindrical

Ad. 15: Plant: branching habit

To be observed on the upper third of the plant

1
unbranched

2
branched

Ad. 16: Stem: color of cortex

1
light green

2
dark green

3
cream

4
purplish

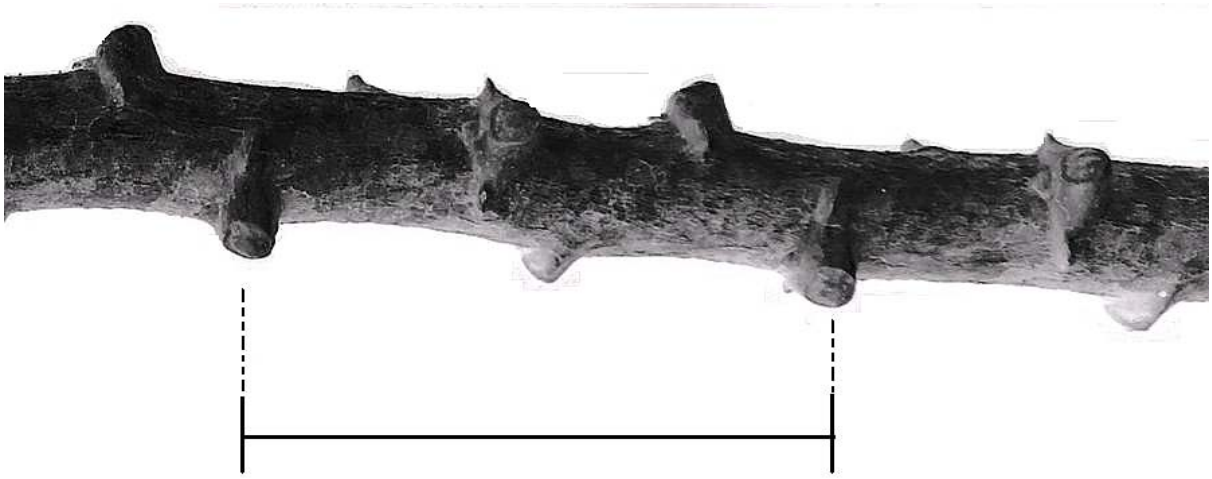
Ad. 19: Stem: growth habit

1
straight

2
zigzag

Ad. 21: Stem: distance between leaf scars on nodes

The characteristic should be observed at the middle third of the plant, and two scars in the same alignment are to be observed



Ad. 23: Root: peduncle

1
absent

9
present

Ad. 28: Root: shape

1
conical

2
conical to cylindrical

3
cylindrical

4
irregular

Ad. 29: Root: cyanide content

Rapid screening assay of cyanide content of cassava (Williams and Edward (1980) method)

This is a rapid, inexpensive screening assay developed in order to measure the cyanide content of cassava (*Manihot esculenta* Crantz.) tubers. A small disc of parenchyma tissue cut with a cork borer or alternatively grated tissue placed in a stoppered glass tube with a filter paper previously spotted with a drop of tetra-base [4,4'-methylenebis-(N,N-dimethylaniline)] and cupric acetate and hydrogen. Cyanide liberated produces a blue color on the filter paper. The intensity of the blue color developed within one hour is rated visually on a graded scale from 0 to 5. The correlation coefficient between samples accurately analyzed for total cyanide and also tested using the rapid assay is 0.77.

Low cyanide content	0 to 1.9
Medium cyanide content	2.0 to 3.9
High cyanide content	4.0 to 5.0

The reference for Williams and Edward (1980) method to chapter 9

Ad. 30: Root: adherence of cortex to flesh

Involves hand removal of root cortex from the middle third of freshly harvested root tuber. Weak adherence is when the cortex is removed round the root tuber without any breakage while strong adherence is when peeling of the cortex exhibits a lot of breaking and for medium adherence there is minimal breaking of the cortex.

9. Literature

Allem, A.C., 2002: The origin and taxonomy of cassava. CABI, pp. 1-16.

Alves, A.A. C., 2002: Cassava botany and physiology. CABI, pp. 67-89.

Brazilian Agricultural Research Corporation *(EMBRAPA)* test guideline for cassava.

Kenya Agricultural Research Institute *(KARI)* 2008/2009 National cassava breeding & improvement program.

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

	Application date: (not to be filled in by the applicant)

TECHNICAL QUESTIONNAIRE
to be completed in connection with an application for plant breeders' rights

1. Subject of the Technical Questionnaire

1.1 Botanical name	*Manihot esculenta* Crantz.
1.2 Common name	Cassava

2. Applicant

Name	
Address	
Telephone No.	
Fax No.	
E-mail address	
Breeder (if different from applicant)	

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

[#]4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]
(please state parent varieties)

(……..……..) x (……..……..)
female parent male parent

(b) partially known cross [ ]
(please state known parent variety(ies))

(……..……..) x (……..……..)
female parent male parent

(c) unknown cross [ ]

4.1.2 Mutation [ ]
(please state parent variety)

4.1.3 Discovery and development [ ]
(please state where and when discovered and how developed)

4.1.4 Other [ ]
(please provide details)

[#] Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

4.2 Method of propagating the variety

4.2.1 Vegetative propagation

(a) cuttings [ ]

(b) *in vitro* propagation [ ]

(c) other (state method) [ ]

4.2.2 Seed [ ]

4.2.3 Other [ ]
(please provide details)

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).

	Characteristics	Example Varieties	Note
5.1 (1)	**Apical leaf: color**		
	light green		1[ ]
	dark green	Clone 2005/0034	2[ ]
	purplish green	Clone 82/001	3[ ]
	purple		4[ ]
5.2 (2)	**Apical leaf: pubescence**		
	absent	Clone 2005/0034	1[ ]
	present	Clone 82/0058	9[ ]
5.3 (3)	**Leaf: predominant shape of central lobe**		
	linear		1[ ]
	elliptic		2[ ]
	obovate		3[ ]
~~**5.4 (4)**~~	~~**Petiole: color**~~		
	~~yellowish green~~	~~Nzalauka, Shibe, Siri~~	~~1[ ]~~
	~~green~~	~~Karibuni~~	~~2[ ]~~
	~~reddish green~~	~~Clone 517, Karembo, Tajirika~~	~~3[ ]~~
	~~greenish red~~		~~4[ ]~~
	~~red~~	~~Clone 2021, Kibandameno, Nguzo~~	~~5[ ]~~
	~~purple~~	~~Clone 1366~~	~~6[ ]~~
5.5 (6)	**Leaf: variegation**		
	absent		1[ ]
	present		9[ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

	Characteristics	Example Varieties	Note
~~**5.6 (10)**~~	~~**Petiole: attitude in relation to stem**~~		
	~~semi erect~~	~~Karembo, Tajirika~~	~~3[ ]~~
	~~horizontal~~	~~Nguzo, Siri~~	~~5[ ]~~
	~~drooping~~	~~Clone 1380, Kibandameno~~	~~7[ ]~~
	~~irregular~~	~~Nzalauka~~	~~9[ ]~~
5.7 (11)	**Stipule: length**		
	very short		1[ ]
	very short to short		2[ ]
	short	Karibuni	3[ ]
	short to medium		4[ ]
	medium	Karembo, Karibuni	5[ ]
	medium to long		6[ ]
	long	Clone 517, Nguzo	7[ ]
	long to very long		8[ ]
	very long		9[ ]
5.8 (17)	**Stem: color of exterior**		
	orange		1[ ]
	greyish yellow	Kibandameno	2[ ]
	greenish yellow	Clone 2021, Siri	3[ ]
	brownish yellow		4[ ]
	light brown	Clone 1380	5[ ]
	dark brown	Kiroba	6[ ]
	silver	Karibuni, Nguzo	7[ ]
5.9 (19)	**Stem: growth habit**		
	straight		1[ ]
	zigzag		2[ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

	Characteristics	Example Varieties	Note
~~**5.10 (22)**~~	~~**Stem: color of end branches (at top 20 cm of plant)**~~		
	~~green~~	~~Karembo, Karibuni~~	~~1[ ]~~
	~~reddish green~~	~~Kibandameno~~	~~2[ ]~~
	~~purplish green~~	~~Nguzo, Nzalauka~~	~~3[ ]~~
	~~greenish purple~~		~~4[ ]~~
	~~purple~~		~~5[ ]~~
	~~red~~	~~Clone 2021~~	~~6[ ]~~
5.11 (29)	**Root: cyanide content**		
	low		1[ ]
	medium		2[ ]
	high		3[ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

6. Similar varieties and differences from these varieties

Please use the following table and box for comments to provide information on how your candidate variety differs from the variety (or varieties) which, to the best of your knowledge, is (or are) most similar. This information may help the examination authority to conduct its examination of distinctness in a more efficient way.

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the **similar** variety(ies)	Describe the expression of the characteristic(s) for **your** candidate variety
Example	*Stem: color of cortex*	*light green*	*dark green*

Comments:

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

[#]7. Additional information which may help in the examination of the variety

7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?

Yes [ ] No [ ]

(If yes, please provide details)

7.2 Are there any special conditions for growing the variety or conducting the examination?

Yes [ ] No [ ]

(If yes, please provide details)

7.3 Other information

8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

If the answer to (b) is yes, please attach a copy of the authorization.

[#] Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

9. Information on plant material to be examined or submitted for examination.

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

(a)	Microorganisms (e.g. virus, bacteria, phytoplasma)	Yes [ ]	No [ ]
(b)	Chemical treatment (e.g. growth retardant, pesticide)	Yes [ ]	No [ ]
(c)	Tissue culture	Yes [ ]	No [ ]
(d)	Other factors	Yes [ ]	No [ ]

Please provide details for where you have indicated “yes”.

……

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant’s name

Signature Date

[End of document]