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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

GRAIN AMARANTH

UPOV Code: AMARA

(Amaranthus L.
excluding ornamental varieties)

*

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

Alternative Names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Amaranthus L.</i>	Amaranth	Amarante	Amarant, Fuchsschwanz	Amaranto

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.]

<u>TABLE OF CONTENTS</u>	<u>PAGE</u>
1. SUBJECT OF THESE TEST GUIDELINES.....	3
2. MATERIAL REQUIRED	3
3. METHOD OF EXAMINATION.....	3
3.1 Number of Growing Cycles	3
3.2 Testing Place	3
3.3 Conditions for Conducting the Examination.....	3
3.4 Test Design	4
3.5 Number of Plants / Parts of Plants to be Examined.....	4
3.6 Additional Tests	4
4. ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY	4
4.1 Distinctness	4
4.2 Uniformity.....	5
4.3 Stability	5
5. GROUPING OF VARIETIES AND ORGANIZATION OF THE GROWING TRIAL.....	5
6. INTRODUCTION TO THE TABLE OF CHARACTERISTICS	6
6.1 Categories of Characteristics.....	6
6.2 States of Expression and Corresponding Notes.....	6
6.3 Types of Expression	6
6.4 Example Varieties	7
6.5 Legend.....	7
7. TABLE OF CHARACTERISTICS/TABLEAU DES CARACTÈRES/ MERKMALSTABELLE/TABLA DE CARACTERES	8
8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS	17
8.1 Explanations covering several characteristics	17
8.2 Explanations for individual characteristics	17
9. LITERATURE	26
10. TECHNICAL QUESTIONNAIRE	28

1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Amaranthus* L., but have been developed on the basis of varieties used for grain production. The main grain species are *Amaranthus caudatus* L., *Amaranthus cruentus* L. and *Amaranthus hypochondriacus* L.. 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 seed.

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

100 g of seed.

2.4 The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority. In cases where the seed is to be stored, the germination capacity should be as high as possible and should be stated by the applicant.

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

2.6 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 two independent growing cycles.

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*

3.3.1 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.

3.3.2 The recommended method of observing the characteristics is indicated by the following key in the second column of the Table 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.

3.4 *Test Design*

3.4.1 In the case of inbred lines, each test should be designed to result in a total of at least 50 plants, which should be divided between two or more replicates.

3.4.2 In the case of cross-pollinated varieties, each test should be designed to result in a total of at least 150 plants, which should be divided between two or more replicates.

3.4.3 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 *Number of Plants / Parts of Plants to be Examined*

Unless otherwise indicated, all observations on single plants should be made on 20 plants or parts taken from each of 20 plants and any other observations made on all plants in the test.

3.6 *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.

4.2 *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 Cross-pollinated varieties

The assessment of uniformity for cross-pollinated varieties should be according to the recommendations for cross-pollinated varieties and inbred lines in the General Introduction.

4.2.3 Inbred lines

For the assessment of uniformity of inbred lines, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 50 plants, two off-types are 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 tested, either by growing a further generation, or by testing a new seed stock to ensure that it exhibits the same characteristics as those shown by the previous 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) Cotyledon: anthocyanin coloration (characteristic 1)
- (b) Seedling: anthocyanin coloration of hypocotyl (characteristic 2)
- (c) Petiole: anthocyanin coloration (characteristic 17)
- (d) Leaf blade: presence of blotch (characteristic 20)
- (e) Leaf blade: shape of blotch (characteristic 23)
- (f) Inflorescence: color (characteristic 24)
- (g) Inflorescence: type (characteristic 27)
- (h) Inflorescence: length of bract relative to utricle (characteristic 29)
- (i) Inflorescence: growth habit (characteristic 30)
- (j) Stem: anthocyanin coloration of base (characteristic 35)
- (k) Stem: shape in cross section (characteristic 36)
- (l) Seed: color (characteristic 37)
- (m) Seed: shape (characteristic 38)
- (n) Seed: type (characteristic 39)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction.

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*

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.

6.3 *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 3.3.2

(a)-(g) 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	Cotyledon: anthocyanin coloration	Cotylédon : pigmentation anthocyanique	Keimblatt: Anthocyanfärbung	Cotiledones: pigmentación antociánica		
QL	(a)	absent	absente	fehlend	ausente	Eniko, Maros, Revancha	1
		present	présente	vorhanden	presente	Edit, Nutrisol, Reka, Rojita	9
2.	VG	Seedling: anthocyanin coloration of hypocotyl	Plantule : pigmentation anthocyanique des hypocotyles	Keimpflanze: Anthocyanfärbung des Hypocotyls	Plántula: Pigmentación antociánica del hipocótilo		
QL	(a)	absent	absente	fehlend	ausente	Mariel	1
		present	présente	vorhanden	presente	Edit, Nutrisol, Rojita	9
3.	VG	Seedling: intensity of anthocyanin coloration of hypocotyl	Plantule : intensité de la pigmentation anthocyanique des hypocotyles	Keimpflanze: Intensität der Anthocyanfärbung des Hypocotyls	Plántula: intensidad de la coloración antociánica del hipocotilo		
QN	(a)	weak	faible	gering	débil	Rojita	3
		medium	moyenne	mittel	media	Edit	5
		strong	forte	stark	fuerte	Nutrisol, Reka	7
4.	MS	Young leaf: length	Jeune feuille : longueur	Junges Blatt: Länge	Hoja joven: longitud		3
QN	(b)	short	courte	kurz	corta	Mariel	3
		medium	moyenne	mittel	mediana	Rojita	5
		long	longue	lang	larga	Nutrisol	7
5.	MS	Young leaf: width	Jeune feuille : largeur	Junges Blatt: Breite	Hoja joven: anchura		
QN	(b)	narrow	étroite	schmal	estrecha	Mariel, Reka	3
		medium	moyenne	mittel	mediana	Nutrisol, Rojita	5
		broad	large	breit	ancha	Roja Tulyehualco	7

		English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
6.	VG	Young leaf: ratio length/width	Jeune feuille : rapport largeur/longueur	Junges Blatt: Verhältnis Breite/Länge	Hoja joven: proporción largo/anchura		
QN	(b)	small	petit	klein	pequeña	Revancha	3
		medium	moyen	mittel	media	Reka	5
		large	grand	groß	grande	Muestra Tulyehualco	7
7.	VG	Young leaf: position of broadest part	Jeune feuille : position de la partie la plus large	Junges Blatt: Position des breitesten Teils	Hoja joven: posición de la parte más ancha		
(+)							
QN	(b)	in middle or slightly towards base	au milieu ou légèrement vers la base	in der Mitte oder leicht zur Basis hin	en el medio o ligeramente hacia la base	Amarilla	1
		moderately towards base	modérément vers la base	mäßig zur Basis hin	moderadamente hacia la base		2
		strongly towards base	fortement vers la base	stark zur Basis hin	fuertemente hacia la base	Edit, Rojita, Roza	3
8.	VG	Young leaf: prominence of veins	Jeune feuille : proéminence des nervures	Junges Blatt: Ausprägung der Adern	Hoja joven: prominencia de nervaduras		
QN	(b)	weak	faible	gering	débil	Rojita	1
		medium	moyenne	mittel	media		2
		strong	forte	stark	fuerte	Nutrisol, Revancha	3
9.	VG	Young leaf: main color on upper side	Jeune feuille : couleur principale de la face supérieure	Junges Blatt: Hauptfarbe an der Oberseite	Hoja joven: color principal del haz		
PQ	(b)	light green	vert clair	hellgrün	verde claro	Reka, Revancha	1
		medium green	vert moyen	mittelgrün	verde medio	Rojita	2
		dark green	vert foncé	dunkelgrün	verde oscuro	Nativa 1 Tulyehualco	3
		red	rouge	rot	rojo	Nutrisol	4
		purple	pourpre	purpurn	purpura	ITAX 0092	5

		English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
10.	VG	Young leaf: distribution of secondary color on upper side	Jeune feuille : distribution de la pigmentation sur la face supérieure	Junges Blatt: Verteilung der Farbpigmentierung an der Oberseite	Hoja joven: distribución del segundo color en el haz		
(+)							
PQ	(b)	colored basal area	surface de la base colorée	gefärbte Basalzone	área basal pigmentada	Rojita	1
		central blotch	tache centrale	zentraler Fleck	mancha central	Edit	2
		colored margin and veins	coloration sur le bord et les nervures	gefärbt am Rand und an den Adern	margen y venas pigmentadas	Reka	3
11.	VG	Young leaf: color on the lower side	Jeune feuille : couleur de la face inférieure	Junges Blatt: Farbe an der Unterseite	Hoja joven: color del envés		
PQ	(b)	green	verte	grün	verde	Reka	1
		red	rouge	rot	rojo	Nutrisol	2
		purple	pourpre	purpurn	púrpura	ITAX0092	3
12.	VG	Leaf: margin	Feuille : bord	Blatt: Rand	Hoja: margen		
(+)							
QL	(c)	entire	entier	ganzrandig	entero	Edit, Rojita, Roza	1
		sinuate	sinué	gebuchtet	sinuoso	Revancha	2
13.	VS	Plant: time of beginning of emergence of inflorescence	Plante : époque de début d'apparition de l'inflorescence	Pflanze: Zeitpunkt des Erscheinens der Blütenstände	Planta: época de aparición de inflorescencia		
(+)							
QN		early	précoce	früh	precoz	Edit	3
		medium	moyenne	mittel	media	Maros, Reka, Roza	5
		late	tardive	spät	tardía	Nutrisol	7
14.	MG	Time of flowering	Époque de floraison	Zeitpunkt der Blüte	Época de floración		
(+)							
QN		early	précoce	früh	precoz	Maros	3
		medium	moyenne	mittel	media	Edit, Reka, Roza	5
		late	tardive	spät	tardía	Nutrisol	7

		English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
15.	VG	Stem: color	Tige : couleur	Stengel: Farbe	Tallo: color		
PQ	(d)	green	verte	grün	verde	Edit, Eniko, Maros, Reka, Revancha	1
		yellow	jaune	gelb	amarillo	Mariel	2
		pink	rose	rosa	rosa	Roza	3
		red	rouge	rot	rojo	Nutrisol	4
		purple	pourpre	purpurn	púrpura	ITAX 00092	5
16.	VG	Stem: color of stripes	Tige : couleur des bandes	Stengel: Farbe der Streifen	Tallo: color de las rayas		
PQ	(d)	red	rouges	rot	rojo	Roja Tulyehualco	1
		red purple	violacés	rotpurpurn	púrpura rojizo		2
		purple	pourpres	purpurn	púrpura	BRS_Alegría	3
17.	VG	Petiole: anthocyanin coloration	Pétiole : pigmentation anthocyanique	Blattstiel: Anthocyanfärbung	Pecíolo: pigmentación antociánica		
(*)							
QL	(d)	absent	absente	fehlend	ausente	Edit, Revancha, Rojita	1
		present	présente	vorhanden	presente	Nutrisol, Roza	9
18.	VG	Petiole: intensity of anthocyanin coloration	Pétiole : intensité de la pigmentation anthocyanique	Blattstiel: Intensität der Anthocyanfärbung	Pecíolo: intensidad de la pigmentación antociánica		
QN	(d)	very weak	très faible	sehr gering	muy débil		1
		weak	faible	gering	débil		3
		medium	moyenne	mittel	media		5
		strong	forte	stark	fuerte	Roza	7
		very strong	très forte	sehr stark	muy fuerte	Nutrisol	9
19.	VG	Leaf blade: main color	Limbe : couleur principale	Blattspreite: Hauptfarbe	Limbo: color principal		
PQ	(d)	light green	vert clair	hellgrün	verde claro	Maros, Revancha	1
		medium green	vert moyen	mittelgrün	verde medio	Rojita, Roza	2
		dark green	vert foncé	dunkelgrün	verde oscuro	Edit	3
		red	rouge	rot	rojo	Gabriela	4

		English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
20. (*) (+)	VG	Leaf blade: presence of blotch	Limbe : présence d'une tache	Blattspreite: Vorhandensein eines Flecks	Lámina de la hoja: presencia de mancha		
QL	(d)	absent	absente	fehlend	ausente	Eniko, Maros, Revancha	1
		present	présente	vorhanden	presente	Edit	9
21. (+)	VG	Leaf blade: size of blotch in relation to blade	Limbe : taille de la tache par rapport au limbe	Blattspreite: Größe des Flecks im Verhältnis zur Spreite	Limbo: tamaño de la mancha con relación al limbo		
QN	(d)	small	petite	klein	pequeño	Roja Tulyehualco	3
		medium	moyenne	mittel	mediano	Edit	5
		large	grande	groß	grande	Mixteco	7
22. (+)	VG	Leaf blade: color of blotch	Limbe : couleur de la tache	Blattspreite: Farbe des Flecks	Limbo: color de la mancha		
PQ	(d)	green	verte	grün	verde	I54	1
		silvery	argentée	silbrig	plateada	Mixteco SLPAZ	2
		red	rouge	rot	roja	Edit	3
		purple	pourpre	purpurn	púrpura	Gabriela	4
23. (*) (+)	VS	Leaf blade: shape of blotch	Limbe : forme de la tache	Blattspreite: Form des Flecks	Limbo: forma de la mancha		
QL	(d)	ovoid	ovoïde	eiförmig	ovalada	Edit	1
		“V” shaped	en “V”	V-förmig	en forma de “V”	Mixteco	2
24. (*)	VG	Inflorescence: color	Inflorescence : couleur	Blütenstand: Farbe	Inflorescencia: color		
PQ	(d)	yellow	jaune	gelb	amarillo	Mariel	1
		green	verte	grün	verde	Eniko, Maros, Revancha	2
		pink	rose	rosa	rosado	Roza	3
		red	rouge	rot	rojo	Edit, Rojita	4
		purple	pourpre	purpurn	púrpura	Nutrisol, Reka	5
		brown	brune	braun	pardo	Tulyehualco	6

		English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
25.	VG	Inflorescence: compactness	Inflorescence : compacité	Blütenstand: Kompaktheit	Inflorescencia: compacidad		
(+)							
QN	(d)	compact	compacte	kompakt	compacta	Nutrisol, Rojita	3
		intermediate	intermédiaire	intermediär	intermedia	Revancha	5
		open	ouverte	locker	lâche	Roza	7
26.	VG	Inflorescence: density of glomerules	Inflorescence : densité des glomérules	Blütenstand: Dichte der Knäuel	Inflorescencia: densidad de los glomerulos		
(+)							
QN	(d)	sparse	lâche	locker	laxa	Tulyehualco	3
		medium	moyenne	mittel	media	Nutrisol, Reka, Rojita	5
		dense	dense	dicht	densa	Edit, Maros, Reka, Rojita	7
27.	VG	Inflorescence: type	Inflorescence : type	Blütenstand: Typ	Inflorescencia: tipo		
(*)							
(+)							
QL	(d)	amarantiform	en forme d'amarante	fuchsschwanz- förmig	amarantiforme	Nutrisol	1
		glomerulate	en forme de glomérule	knäueelförmig	glomerulada	Reka, Revancha, Roza	2
28.	MS	Inflorescence: number of female flowers per glomerule	Inflorescence : nombre de fleurs femelles par glomérule	Blütenstand: Anzahl weibliche Blüten je Knäuel	Inflorescencia: número de flores femeninas por glomérulo		
QN	(d)	few	petit	gering	pocas	Nutrisol	3
		medium	moyen	mittel	medias	Maros, Revancha, Roza	5
		many	grand	groß	muchas	Reka	7
29.	VG	Inflorescence: length of bract relative to utricle	Inflorescence : longueur de la bractée par rapport à l'utricule	Blütenstand: Länge des Deckblattes im Verhältnis zum Schlauch	Inflorescencia: longitud de las brácteas con relación al utrículo		
(*)							
(+)							
QN	(d)	shorter	plus courte	kürzer	más cortas	Reka	1
		equal	égale	gleich lang	igual	Revancha	2
		longer	plus longue	länger	más largas	Edit, Nutrisol	3

		English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
30.	VG	Inflorescence: growth habit	Inflorescence : type de croissance	Blütenstand: Wuchstyp	Inflorescencia: habito de crecimiento		
QL	(d)	determinate	déterminée	determiniert	determinado	Eniko, Maros, Revancha	1
		indeterminate	indéterminée	nicht determiniert	indeterminado	Nutrisol	2
31.	VG	Inflorescence: attitude	Inflorescence : port	Blütenstand: Haltung	Inflorescencia: porte		
(+)							
QN	(d)	upright or weakly recurved	dressé ou faiblement retombant	aufrecht oder leicht gebogen	erecto o débilmente recurvado	Nutrisol	1
		moderately recurved	intermédiaire	mittel	intermedio	Roza	2
		strongly recurved	fortement retombant	stark gebogen	fuertemente recurvado	Reka	3
32.	VG	Inflorescence: length	Inflorescence : longueur	Blütenstand: Länge	Inflorescencia: longitud		
QN	(d)	short	courte	kurz	corta	Edit	3
		medium	moyenne	mittel	media	Maros, Revancha, Roza	5
		long	longue	lang	larga	Nutrisol	7
33.	MG	Plant: time of maturity	Plante : époque de maturité	Pflanze: Zeitpunkt der Reife	Planta: época de madurez		
(+)							
QN	(e)	early	précoce	früh	precoz	Edit	3
		medium	moyenne	mittel	media	Maros, Revancha, Roza	5
		late	tardive	spät	tardía	Nutrisol	7
34.	MG	Plant: length	Plante : longueur	Pflanze: Länge	Planta: longitud		
(+)							
QN	(e)	short	basse	niedrig	baja	Edit	3
		medium	moyenne	mittel	media	Reka, Revancha, Roza	5
		tall	haute	hoch	alta	Nutrisol	7

		English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
35. (*)	VG	Stem: anthocyanin coloration of base	Tige : pigmentation anthocyanique de la base	Stengel: Anthocyanfärbung der Basis	Tallo: pigmentación antociánica de la base		
QL	(e)	absent	absente	fehlend	ausente	Revancha	1
		present	présente	vorhanden	presente	Nutrisol, Roza	9
36. (*) (+)	VG	Stem: shape in cross section	Tige : forme en section transversale	Stengel: Form im Querschnitt	Tallo: forma de la sección transversal		
QL	(e)	circular	circulaire	rund	circular	Reka	1
		undulated	ondulée	gewellt	ondulado	Edit, Revancha, Roza	2
37. (*)	VG	Seed: color	Graine : couleur	Samen: Farbe	Semilla: color		
PQ	(f)	white	blanche	weiß	blanco	Edit, Maros, Revancha, Roza	1
		yellow	jaune	gelb	amarillo	ITAX0053	2
		pink	rose	rosa	rosa	Reka	3
		brown	brune	braun	marrón	Mixteco café	4
		black	noire	schwarz	negro	Mixteco negro	5
38. (*) (+)	VG	Seed: shape	Graine : forme	Samen: Form	Semilla: forma		
QL	(f)	ellipsoid	ellipsoïde	ellipsoid	elipsoidal	Nutrisol, Revancha	1
		discoid	discoïde	scheibenförmig	discoide	Rojita	2
39. (*) (+)	VG	Seed: type	Graine: type	Samen: Typ	Semilla: tipo		
QL	(f)	flint	cristalline	hart	cristalino	Nutrisol, Rojita	1
		floury	farineuse	mehlig	harinoso	Edit, Revancha	2

		English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
40.	MG	Seed: weight per 1000 seeds	Graine : poids pour 1000 graines	Samen: Tausendkorn- gewicht	Semilla: peso de 1000 semillas		
	(+)						
QN	(f)	low	faible	gering	bajo		3
		medium	moyen	mittel	medio		5
		high	élevé	hoch	alto		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 on the seedling which should be made 3-6 days after emergence
- (b) Observations on the young plant with 6 to 8 leaves
- (c) Observations should be made at vegetative stage, just before inflorescence emergence
- (d) Observations should be made at full flowering: 50% of the plants (see Ad. 14)
- (e) Observations should be made at physiological maturity (see Ad. 33)
- (f) Observations should be made on dry seeds at harvest time

8.2 *Explanations for individual characteristics*

Ad. 7: Young leaf: position of broadest part



1
in middle or slightly towards
base



2
moderately towards base



3
strongly towards base

Ad. 10: Young leaf: distribution of secondary color on upper side



1
colored basal area



2
central blotch



3
colored margin and veins

Ad. 12: Leaf: margin

To be assessed on the last fully-developed leaf, before the inflorescence appears.



1
entire



2
sinuate

Ad. 13: Time of beginning of emergence of inflorescence

The time of beginning of emergence of inflorescence is when 50 % of the plants have an inflorescence of at least 1 cm in length in the apex of the main stem.

Ad. 14: Time of flowering

The time of flowering is when 50 % of the plants have a panicle approximately 5 cm long, showing open flowers in its middle parts with separate stamens and with the stigma completely visible.

Ad. 20: Leaf blade: presence of blotch



1
absent



9
present

Ad. 21: Leaf blade: size of blotch in relation to blade



3
small



5
medium



7
large

Ad. 22: Leaf blade: color of blotch



1
green



2
silvery



3
red



4
purple

Ad. 23: Leaf blade: shape of blotch



1
ovoid



2
"V" shaped

Ad. 25: Inflorescence: compactness

Compactness of the inflorescence is defined by the angle formed between the lateral branches in relation to the main axis of the inflorescence.



3
compact



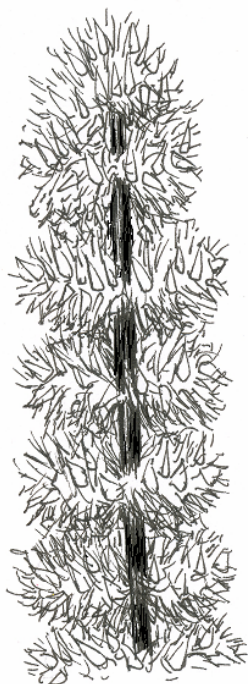
5
intermediate



7
open

Ad. 26: Inflorescence: density of glomerules

The density of glomerules should be observed on the lateral branches of the main inflorescence.



3
sparse



5
medium



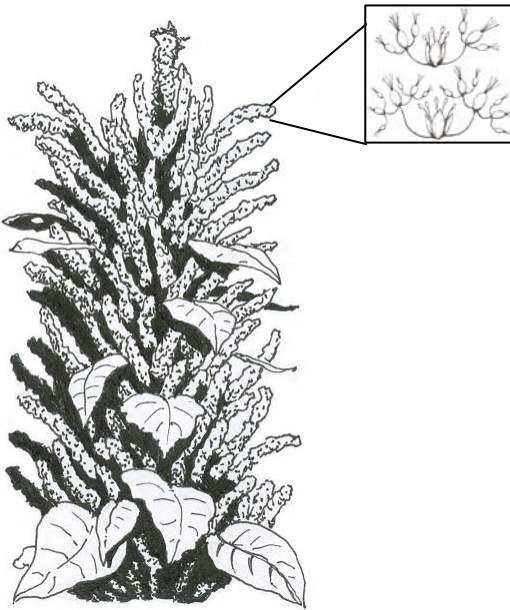
7
dense

Ad. 27: Inflorescence: type

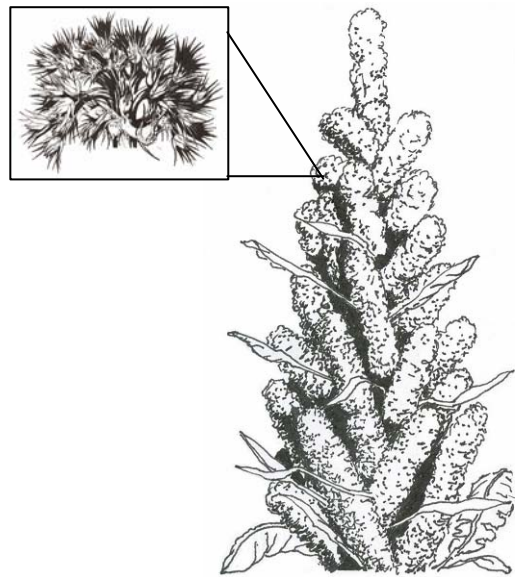
Inflorescence type should be observed from flowering stage up to fully developed grains.

Amarantiform: if the glomerules are inserted in the secondary axes and the glomerules have an extended shape, the inflorescences are 'amarantiform'.

Glomerulate: if the glomerules are inserted in the primary axes and the glomerules have a spherical shape, the inflorescences are 'glomerulate'.



1
amarantiform



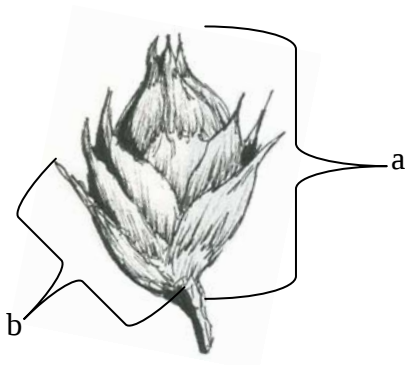
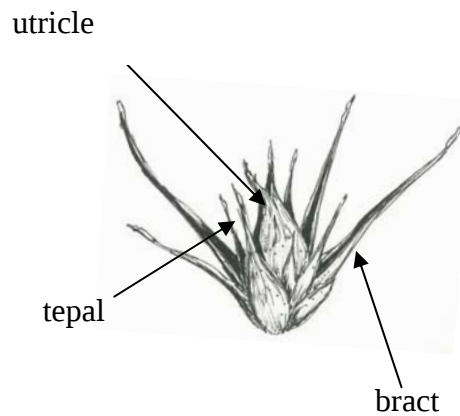
2
glomerulate

Ad. 29: Inflorescence: length of bract relative to utricle

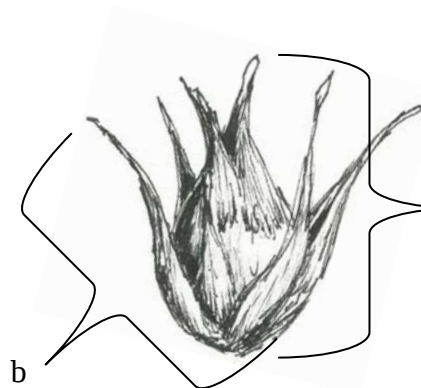
It is recommended to make the observation with a microscope.

Utricle: formed by the mature seed and the opercule (the dehiscent layer which covers the seed)

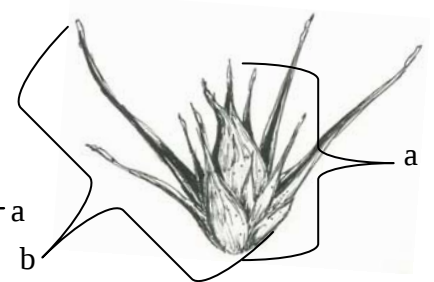
Bracts: the structures outside the tepals which protect the utricle



1
shorter



2
equal



3
longer

a: length of utricle
b: length of bract

Ad. 31: Inflorescence: attitude



1
upright or weakly
recurved



2
moderately
recurved



3
strongly recurved

Ad. 33: Plant: time of maturity

The time of plant maturity is when seed taken from the central part of the inflorescence does not change shape when pressed between fingers.

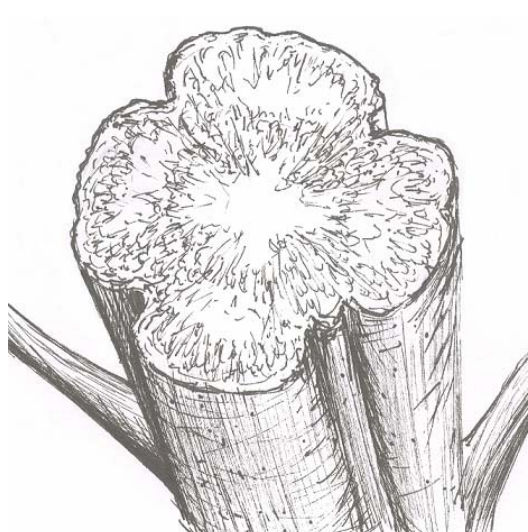
Ad. 34: Plant: length

To be measured from the base of the plant to the tip of the inflorescence.

Ad. 36: Stem: shape in cross section

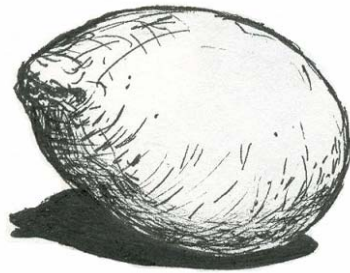


1
circular



2
undulated

Ad. 38: Seed: shape



1
ellipsoid



2
discoid

Ad. 39: Seed type

The type of seed should be observed by diaphanoscopy, i.e. using a box with a glass lid and a light source within. The seed is placed on the glass lid: if the light is transmitted through the seed, it is flint type seed; if the light is not transmitted, it is floury type seed.



1
flint



2
floury

Ad. 40: Seed weight per 1000 seeds

The seed weight should be measured on eight samples of 1000 seeds, at a moisture of 10%.

9. Literature

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Waiker, W.G., Rockwell, W.C., Kohler, G.O., 1970: Preparation and evaluation of popped grains for use. *Cereal Chem.* 47.

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	Amaranthus L.	
1.2 Common Name	Amaranth	
	Species (please complete) 	
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:
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#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)	[]
(b) partially known cross (please state known parent variety(ies))	[]
(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)

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Self-pollination	[]
(b) Cross-pollination	
(i) population	[]
(ii) synthetic variety	[]
(c) Hybrid	[]
(d) Other	[]

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:
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 Cotyledon: anthocyanin coloration (1)			
absent	Eniko, Maros, Revancha	1[]	
present	Edit, Nutrisol, Reka, Rojita	9[]	
5.2 Seedling: anthocyanin coloration of hypocotyl (2)			
absent	Mariel	1[]	
present	Edit, Nutrisol, Rojita	9[]	
5.3 Petiole: anthocyanin coloration (17)			
absent	Edit, Revancha, Rojita	1[]	
present	Nutrisol, Reka, Roza	9[]	
5.4 Leaf blade: presence of blotch (20)			
absent	Eniko, Maros, Revancha	1[]	
present	Edit	9[]	
5.5 Leaf blade: shape of blotch (23)			
ovoid	Edit	1[]	
“V”shaped	Mixteco	2[]	
5.6 Inflorescence: color (24)			
yellow	Mariel	1[]	
green	Eniko, Maros, Revancha	2[]	
pink	Roza	3[]	
red	Edit, Rojita	4[]	
purple	Nutrisol, Reka	5[]	
brown	Tulyehualco	6[]	

TECHNICAL QUESTIONNAIRE		Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note	
5.7 Inflorescence: type (27)			
amarantiform	Nutrisol	1[]	
glomerulate	Reka, Revancha, Roza	2[]	
5.8 Inflorescence: length of bract relative to utricle (29)			
shorter	Reka	1[]	
equal	Revancha	2[]	
longer	Edit, Nutrisol	3[]	
5.9 Inflorescence: growth habit (30)			
determinate	Eniko, Maros, Revancha	1[]	
indeterminate	Nutrisol	2[]	
5.10 Stem: anthocyanin coloration of base (35)			
absent	Revancha	1[]	
present	Nutrisol, Roza	9[]	
5.11 Stem: shape in cross section (36)			
circular	Reka	1[]	
undulated	Edit, Revancha, Roza	2[]	
5.12 Seed: color (37)			
white	Edit, Maros, Revancha, Roza	1[]	
yellow	ITAX0053	2[]	
pink	Reka	3[]	
brown	Mixteco café	4[]	
black	Mixteco negro	5[]	

TECHNICAL QUESTIONNAIRE		Page {x} of {y}	Reference Number:
Characteristics		Example Varieties	Note
5.13 (38)	Seed: shape		
	ellipsoid	Nutrisol, Revancha	1[]
	discoid	Rojita	2[]
5.14 (39)	Seed: type		
	flint	Nutrisol, Rojita	1[]
	floury	Edit, Revancha	2[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:	
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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
<i>Example</i>	<i>Plant: time of beginning of emergence of inflorescence</i>	<i>early</i>	<i>medium</i>

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:
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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				

[End of document]