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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:*

Botanical name	*English*	*French*	*German*	*Spanish*
Amaranthus L.	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.]

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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 Farbpigmen-tierung 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	knäuelförmig	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

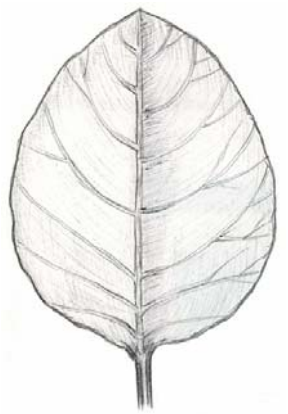
1
colored basal area

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

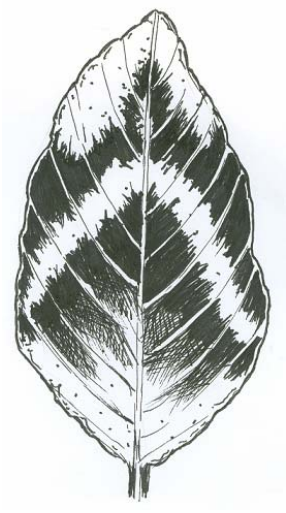
2
silvery

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.

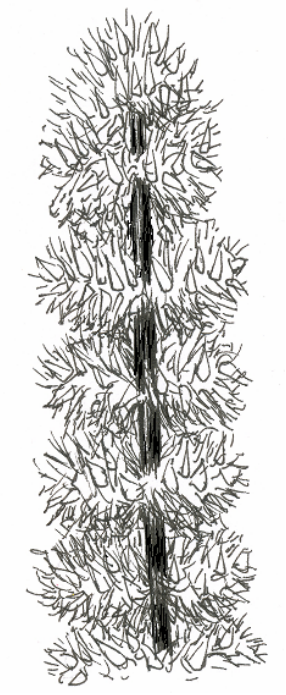
3
compact

5
intermediate

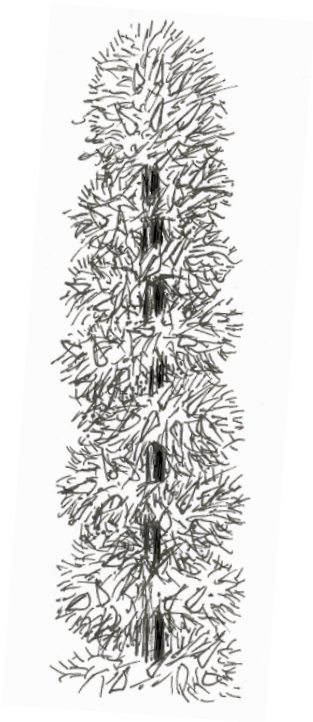
7
open

Ad. 26: Inflorescence: density of glomerules

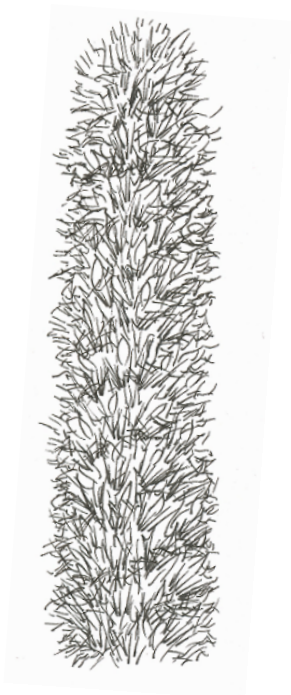
The density of glomerules should be observed on the lateral branches of the main inflorescence.



3
sparse



5
medium



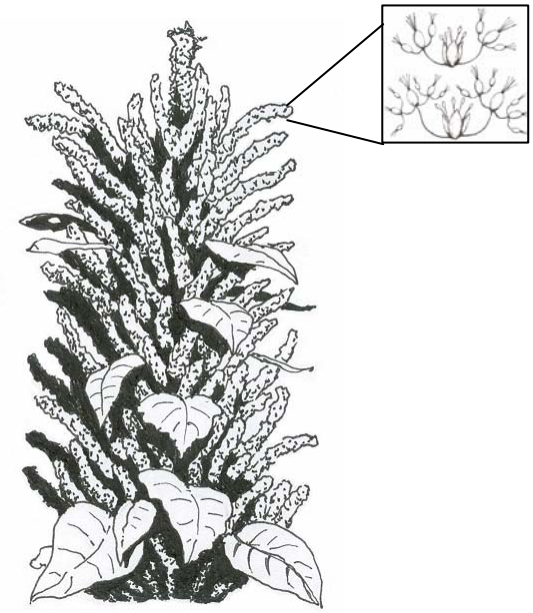
7
dense

Ad. 27: Inflorescence: type

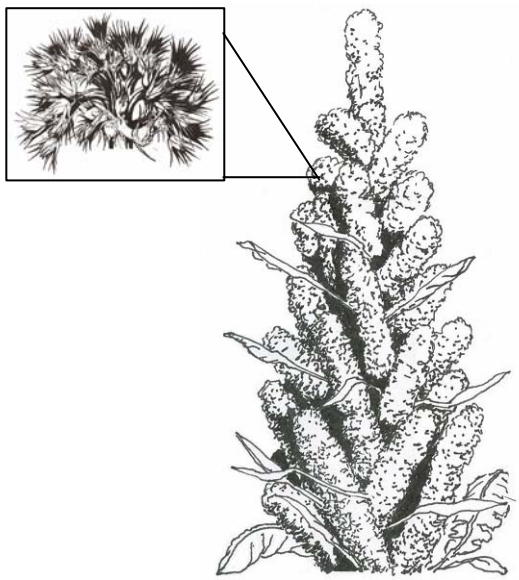
Inflorescence type should be observed from flowering stage up to fully developed grains.

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



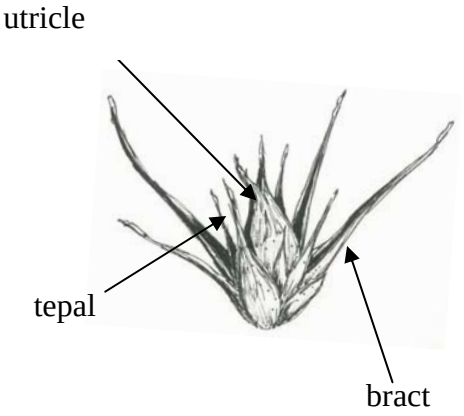
2
glomerulate

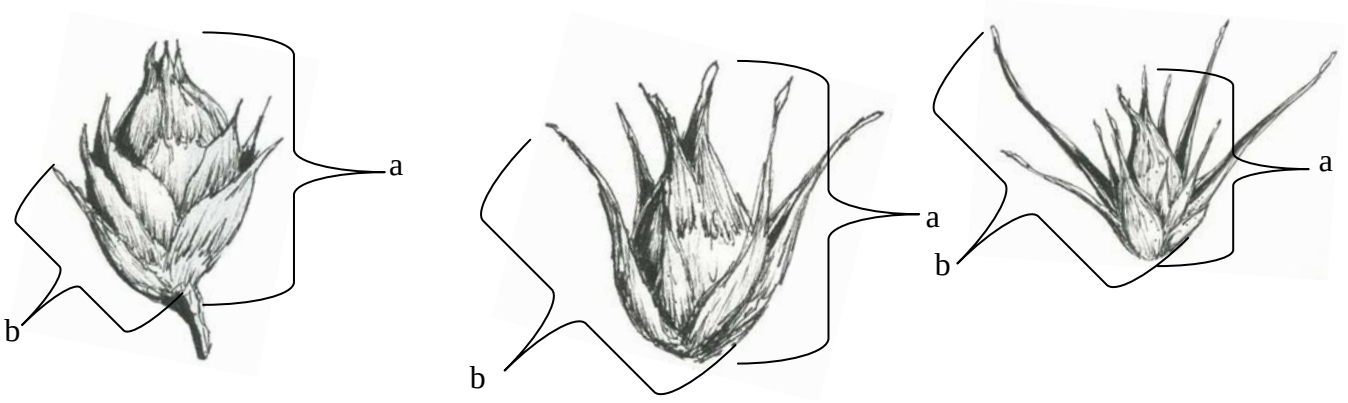
Ad. 29: Inflorescence: length of bract relative to utricle

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

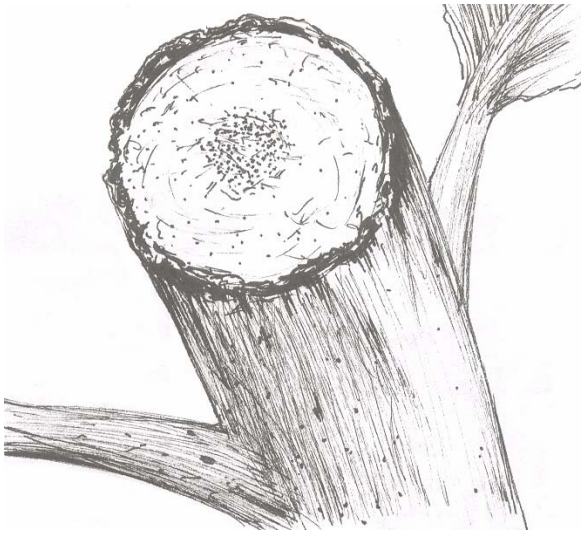
Ad. 33: Plant: time of maturity

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

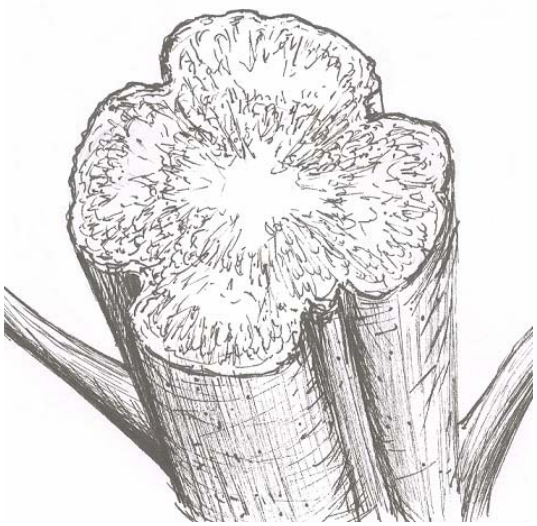
Ad. 34: Plant: length

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

Ad. 36: Stem: shape in cross section

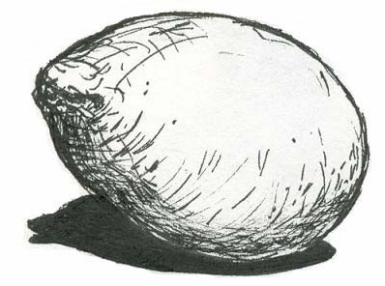


1
circular



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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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:

[#]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 (1)	**Cotyledon: anthocyanin coloration**		
	absent	Eniko, Maros, Revancha	1[ ]
	present	Edit, Nutrisol, Reka, Rojita	9[ ]
5.2 (2)	**Seedling: anthocyanin coloration of hypocotyl**		
	absent	Mariel	1[ ]
	present	Edit, Nutrisol, Rojita	9[ ]
5.3 (17)	**Petiole: anthocyanin coloration**		
	absent	Edit, Revancha, Rojita	1[ ]
	present	Nutrisol, Reka, Roza	9[ ]
5.4 (20)	**Leaf blade: presence of blotch**		
	absent	Eniko, Maros, Revancha	1[ ]
	present	Edit	9[ ]
5.5 (23)	**Leaf blade: shape of blotch**		
	ovoid	Edit	1[ ]
	“V”shaped	Mixteco	2[ ]
5.6 (24)	**Inflorescence: color**		
	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 (27)	**Inflorescence: type**		
	amarantiform	Nutrisol	1[ ]
	glomerulate	Reka, Revancha, Roza	2[ ]
5.8 (29)	**Inflorescence: length of bract relative to utricle**		
	shorter	Reka	1[ ]
	equal	Revancha	2[ ]
	longer	Edit, Nutrisol	3[ ]
5.9 (30)	**Inflorescence: growth habit**		
	determinate	Eniko, Maros, Revancha	1[ ]
	indeterminate	Nutrisol	2[ ]
5.10 (35)	**Stem: anthocyanin coloration of base**		
	absent	Revancha	1[ ]
	present	Nutrisol, Roza	9[ ]
5.11 (36)	**Stem: shape in cross section**		
	circular	Reka	1[ ]
	undulated	Edit, Revancha, Roza	2[ ]
5.12 (37)	**Seed: color**		
	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:

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	*Plant: time of beginning of emergence of inflorescence*	*early*	*medium*

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]