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**INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS**

GENEVA

**TECHNICAL WORKING PARTY  
FOR  
AGRICULTURAL CROPS**

**Thirty-First Session  
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WORKING PAPER ON DRAFT TEST GUIDELINES FOR AMARANTH

*Document prepared by experts from Mexico*

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### I. Subject to these Guidelines

These Test Guidelines apply to all varieties of *Amaranthus* spp. L.

### II. Material Required

1. The competent authorities decide when, where and in what quantity and quality the seed required for testing the variety is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must make sure that all customs formalities are complied with. The minimum quantity of seed to be supplied by the applicant in one or several samples should be:

100g.

2. The seed should at least meet the minimum requirements for germination capacity, moisture content and purity for marketing certified seed in the country in which the application is made. The germination capacity should be as high as possible.

3. The plant material must not have undergone any treatment unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

### III. Conduct of Tests

1. The minimum duration of tests should normally be two similar growing periods.

2. The tests should normally be conducted at one place. If any important characteristics of the variety cannot be seen at that place, the variety may be tested at an additional place.

3. The tests should be carried out under conditions ensuring normal growth. The size of the plots should be such that plants or parts of plants may be removed for measurement and counting without prejudice to the observations which must be made up to the end of the growing period. As a minimum each test should include a total of 150 plants, which should be divided between two or more replicates. Separate plots for observation and for measuring can only be used if they have been subject to similar environmental conditions.

4. The plots should keep an adequate isolate of crops of different varieties, to avoid cross pollination.

5. Additional tests for special purposes may be established.

### IV. Methods and Observations

1. All observations determined by measurement or counting should be made on 20 plants or parts of 20 plants.

2. For the assessment of uniformity a population standard of 1 % with an acceptance probability of 95% should be applied. The maximum number of off-types allowed would be 4.

3. All observations of the growth habit, leaf, root and on the stem should be made at full flowering (50% of the plants).
4. All observations on the seed should be made on dry seed at harvest time. The seed weight should be measured on eight samples of 100 seeds, at moisture of 10%.
5. When resistance characteristics are used for assessing distinctness, uniformity and stability, records must be taken under conditions of controlled infection on at least 20 plants.

#### V. Grouping of Varieties

1. The collection of varieties to be grown should be divided into groups to facilitate the assessment of distinctness. Characteristics which are suitable for grouping purposes, are those which are known from experience not to vary, or to vary only slightly, within a variety. Their various states of expression should be fairly evenly distributed throughout the collection.

#### VI. Characteristics and Symbols

1. To assess distinctness, uniformity and stability, the characteristics and their states as given in the three UPOV working languages in the Table of Characteristics should be used.
2. Notes (1 to 13), for the purposes of electronic data processing, are given opposite the states of expression for each characteristic.

#### 3. Legend:

\* Characteristics that should be used on all varieties in every growing period over which the examinations are made and always be included in the variety descriptions, except when the state of expression of a preceding characteristic or regional environmental conditions render this impossible.

+ See explanations of the Table of Characteristics in chapter VIII.

VII. Table of Characteristics/ Table de caractères /Merkmalstabelle/Tablă de caractere

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>1. Specie</b>			<b>Especie</b>		
A.hypochondriacus			A.hypochondriacus		1
A.cruentus			A.cruentus		2
A.caudatus			A.caudatus		3
A.hybridus			A.hybridus		4
other:statespecie			otra:indique		5
<b>2. Cotyledon: anthocyanin pigmentation</b>			<b>Cotiledones: pigmentación antociánica</b>		
absent			ausente		1
present			presente		9
<b>3. Seedling: anthocyanin pigmentation</b>			<b>Plántula: pigmentación antociánica</b>		
absent			ausente		1
present			presente		9
<b>4. Seedling:intensity ofanthocyanin pigmentationof hypocotyl</b>			<b>Plántula:intensidad delapigmentación antociánicadel hipocótilo</b>		
weak			débil		3
medium			media		5
strong			fuerte		7
<b>5. Plant:growthhabit</b>			<b>Planta:hábitode crecimiento</b>		
upright			erecto		1
spreading			extendido		2
decumbent			decumbente		3
drooping			colgante		4

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>6. Leaf:shape</b>			<b>Hoja:forma</b>		
(+)					
lanceolate			lanceolada		1
elliptic			elíptica		2
cuneate			cuneada		3
ovate			ovada		4
			ovatainada		5
rhombic			rómbica		6
ovoid			oval		7
other:stateshape			otra:indique		8
<b>7. Leaf:typeofmargin</b>			<b>Hoja:tipodeborde</b>		
(+)					
entire			entero		1
crenate			crenado		2
undulate			ondulado		3
other:statetype			otra:indique		4
<b>8. Leaf:length</b>			<b>Hoja:longitud</b>		
short			corta		3
medium			media		5
long			larga		7
<b>9. Leaf:width</b>			<b>Hoja:anchura</b>		
narrow			estrecha		3
medium			media		5
broad			ancha		7

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>10. Leaf:anthocyanin pigmentation</b>			<b>Hoja:pigmentación antociánica</b>		
absent			ausente		1
present			presente		9
<b>11. Leaf:intensityof anthocyanin pigmentationon petiole</b>			<b>Hoja:intensidadde lapigmentación antociánicadel pecíolo</b>		
absentorveryweak			ausenteomuydébil		1
weak			débil		3
medium			media		5
strong			fuerte		7
verystrong			muyfuerte		9
<b>12. Leaf:prominenceof veins(st age6 -8 leaves)</b>			<b>Hoja:prominencia denervaduras (etapade6 -8hojas)</b>		
weak			débil		3
medium			media		5
strong			fuerte		7
<b>13. Leaf:pubescence (asfor12)</b>			<b>Hoja:pubescencia (comopara12)</b>		
absentorveryweak			ausenteomuydébil		1
weak			débil		3
medium			media		5
strong			fuerte		7
verystrong			muyfuerte		9
<b>14. Leaf:presenceof spinesinaxil</b>			<b>Hoja:presenciade espinasenlaaxila</b>		
absent			ausente		1
present			presente		9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>15. Leaf:color</b>			<b>Hoja:color</b>		
green			verde		1
orange			anaranjado		2
red			rojo		3
<b>16. Leaf:presenceof spot</b>			<b>Hoja:presenciade mancha</b>		
absent			ausente		1
present			presente		9
<b>17. Leaf:sizeofspotin relationtotheleaf size</b>			<b>Hoja:proporciónde lamanchacon relaciónaltam año delahoja</b>		
small(<1/3ofthe leaf)			pequeña(<1/3dela hoja)		3
medium(2/3ofthe leaf)			intermedia(2/3dela hoja)		5
large(>2/3ofthe leaf)			grande(>2/3dela hoja)		7
<b>18. Leaf:colorofspot</b>			<b>Hoja:colordela mancha</b>		
silvery			plateada		1
red			roja		2
purple			púrpura		3
<b>19. Leaf:distributionof spot</b>			<b>Hoja:distribución delamancha</b>		
ovoid			ovalada		1
Vshaped			enformade“V”		2



English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>20. Leaf: distribution of pigmentat ion at growth beginning</b>			<b>Hoja: distribución de la pigmentación de las hojas al inicio de crecimiento</b>		
all blade is purple			toda lámina púrpura		1
all blade is red			toda lámina roja		2
all the blade is pink			toda lámina rosada		3
colored basal area			área basal pigmentada		4
central spot			mancha central		5
2 stripes V shaped			dos franjas en forma de "V"		6
one stripe V shaped			una franja en forma de "V"		7
colored margin and venation			margen y venas pigmentadas		8
one strip pale green or chlorotic			una franja verde pálido o clorótica		9
green			verde normal		10
dark green			verde oscuro		11
undersurface purple			envés púrpura		12
other: state distribution			otra: indique		13
<b>21. Plant: time of flowering</b>			<b>Planta: época de floración</b>		
early			precoz		3
medium			media		5
late			tardía		7
<b>22. Plant: pubescence of apical bud</b>			<b>Planta: Pubescencia de la yema apical</b>		
absent			ausente		1
present			presente		9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>23. Plant: basal branching</b>			<b>Planta: ramificación basal</b>		
absent			ausente		1
weak			débil		3
medium			media		5
strong			fuerte		7
very strong			muy fuerte		9
<b>24. Basal branching: length</b>			<b>Ramificación basal: longitud</b>		
short			corta		3
medium			media		5
long			larga		7
<b>25. Lateral branching: length</b>			<b>Ramificación lateral: longitud</b>		
short			corta		3
medium			media		5
long			larga		7
<b>26. Stem: color (at anthesis)</b>			<b>Tallo: color (en antesis)</b>		
green			verde		1
orange			anaranjado		2
pink			rosa		3
red			rojo		4
stripped			estriado		5
other: state color			otro: indique		6
<b>27. Stem: anthocyanin pigmentation on base (at maturity)</b>			<b>Tallo: Pigmentación de antocianina en la base (en madurez)</b>		
absent			ausente		1
present			presente		9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>28. Stem:pubescence</b>			<b>Tallo:pubescencia</b>		
absentor veryweak			ausenteomuydébil		1
weak			débil		3
medium			media		5
strong			fuerte		7
verystrong			muyfuerte		9
<b>29. Stem:marginin crosssection(at maturity)</b>			<b>Tallo:bordedela seccióntransversal (enmadurez)</b>		
flat			liso		1
undulate			ondulado		2
<b>30. Lateral inflorescence:length</b>			<b>Inflorescencia lateral:longitud</b>		
short			corta		3
medium			media		5
long			larga		7
<b>31. Maininflorescence: attitude (+)</b>			<b>Inflorescencia principal:porte</b>		
upright			erecto		3
spreading			medio		5
drooping			colgante		7
<b>32. Maininflorescence: length</b>			<b>Inflorescencia principal:longitud</b>		
short			corta		3
medium			media		5
long			larga		7

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>33. Main inflorescence: color</b>			<b>Inflorescencia principal: color</b>		
white			blanco		1
yellow			amarillo		2
green			verde		3
pink			rosa		4
brown			pardo		5
red			rojo		6
purple			púrpura		7
other: state color			otro: indique		8
<b>34. Main inflorescence: density (+)</b>			<b>Inflorescencia principal: densidad</b>		
lax			laxa		3
medium			media		5
dense			densa		7
<b>35. Inflorescence:</b>			<b>Inflorescencia: enverdecimiento de la panícula</b>		
absent			ausente		1
present			presente		9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>36. Inflorescence: shape</b>			<b>Inflorescencia: forma</b>		
(+)					
amaranthform			amarantiforme		1
glomeruleform			glomerulada		2
<b>37. Inflorescence: growth type</b>			<b>Inflorescencia: tipo de crecimiento</b>		
determinate			determinado		1
indeterminate			indeterminado		2
<b>38. Inflorescence: number of female flowers by glomerule</b>			<b>Inflorescencia: número de flores femeninas por glomérulo</b>		
few			pocas		3
medium			medias		5
many			muchas		7
<b>39. Inflorescence: presence of axillary inflorescence</b>			<b>Inflorescencia: presencia de inflorescencia axilar</b>		
absent			ausente		1
present			presente		9
<b>40. Inflorescence: size of bract relative to utricle</b>			<b>Inflorescencia: tamaño de las brácteas con relación al utrículo</b>		
smaller			más pequeñas		1
same size			del mismo tamaño		2
larger			más grandes		3
<b>41. Inflorescence: type</b>			<b>Inflorescencia: tipo</b>		
determinate and terminal			diferenciada y terminal		1
indeterminate			no diferenciada		2

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>42. Inflorescence: time of emergence of inflorescence</b>			<b>Inflorescencia: época de emergencia de inflorescencia</b>		
early			precoz		3
medium			media		5
late			tardía		7
<b>43. Leaf: distribution of pigmentation at maturity</b>			<b>Hoja: distribución de la pigmentación en madurez</b>		
all blade is purple			toda lámina púrpura		1
all blade is red			toda lámina roja		2
all the blade is pink			toda lámina rosada		3
colored basal area			área basal pigmentada		4
central spot			mancha central		5
2 stripes V shaped			dos franjas en forma de "V"		6
one stripe V shaped			una franja en forma de "V"		7
colored margin and venation			margen y venas pigmentadas		8
one stripe pale green or chlorotic			una franja verde pálido o clorótica en verde normal		9
green			verde normal		10
dark green			verde oscuro		11
other: state distribution			otra: indique		13

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>44. Root:color(at maturity)</b>			<b>Raíz:color(en madurez)</b>		
white			blanca		1
red			roja		2
<b>45. Plant:height(at maturity)</b>			<b>Planta:altura(en madurez)</b>		
short			baja		3
medium			media		5
tall			alta		7
<b>46. Plant:timeof maturity</b>			<b>Planta:épocade madurez</b>		
early			precoz		3
medium			media		5
late			tardía		7
<b>47. Seed:weightper 1000grains</b>			<b>Semilla:pesode 1000semillas</b>		
low			bajo		3
medium			medio		5
high			alto		7
<b>48. Seed:color</b>			<b>Semilla:color</b>		
white			blanco		1
yellow-white			blancoamarillento		2
yellow			amarillo		3
buffcolo red			ante		4
brown			café		5
pink			rosa		6
black			negro		7
mixed			mezcladecolores		8
other:statecolor			otro:indique		9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>49. Seed:shape</b>			<b>Semilla:forma</b>		
spheroid			esférica		1
ellipsoid			elipsoidal		2
discoid			discoide		3
<b>50. Seed:type</b>			<b>Semilla:tipo</b>		
translucent			traslúcido		3
medium			intermedio		5
opaque			opaco		7
<b>51. Seed:poppercent (relativeincreaseof volume)</b>			<b>Semilla:porcentaje dereventado (aumentorelativode volumen)</b>		
low			bajo		3
medium			medio		5
high			alto		7
<b>52. Mainuse</b>			<b>Usoprincipal</b>		
grain			grano		1
candy			dulce		2
vegetable			hortaliza		3
fodder			forraje		4
ornamental			ornamental		5
medicinal			medicinal		6
other:stateuse			otro:indique		7
<b>53. Resistanceto <u>Albugoblitti</u> (+)</b>			<b>Resistenciaa <u>Albugo blitti</u></b>		
absent			ausente		1
present			presente		9



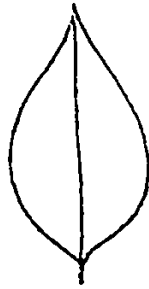
English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>54. Resistanceto <u>Macrophomasp.</u></b> (+)			<b>Resistenciaa <u>Macrophomasp.</u></b>		
absent			ausente		1
present			presente		9
<b>55. Resistanceto <u>Thecaphora amaranthi</u></b> (+)			<b>Resistenciaa <u>Thecaphora amaranthi</u></b>		
absent			ausente		1
present			presente		9

VIII. ExplanationsontheTableofCharacteristics

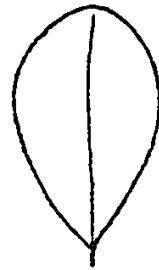
Ad.6:Leaf:shape



1  
lanceolate

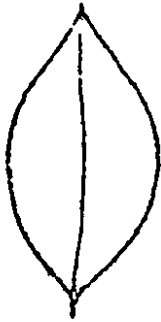


2  
elliptic

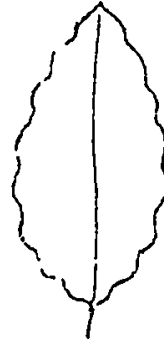


4  
ovate

Ad.7:Leaf:typeof margin



1  
entire

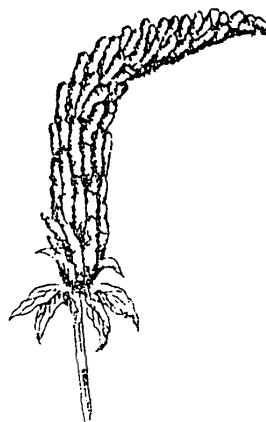


3  
undulate

Ad.31:Maininflorescence:attitude



3  
upright



5  
spreading



7  
drooping

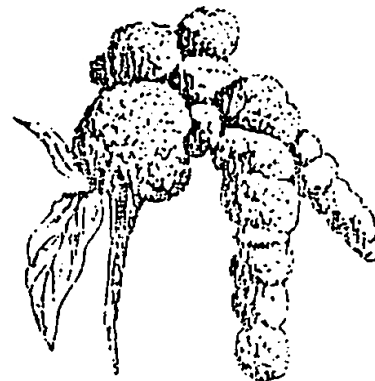
Ad.34 : Inflorescence: density



3  
lax



5  
medium



7  
dense

Ad.36: Inflorescence: shape



1  
amaranthform



2  
glomeruleform

IX. Literature

- Mexican Experts in *Amaranth* Carballo, Aquiles, e -mail: [carballo@colpos.colpos.mx](mailto:carballo@colpos.colpos.mx), Coordinator. Bernal, Roberto, Instituto Tecnológico Agropecuario (ITA) 29. Barrales, Sergio, Universidad Autónoma Chapingo (UACH). Sandoval, Humberto y Trinidad, José Antonio, Colegio de Postgraduados (CP). Espitia, Eduardo, INIFAP.
- Figures from “ Descriptores del germoplasma de Kiwicha”. Programa de Investigación de Cultivos Andinos, Instituto Nacional de Investigación Agraria. Universidad Nacional del Cusco, Perú.
- Descriptors used by OMNI -Hungary (provided by COBORU)

X Technical Questionnaire

	Reference Number (not to be filled in by the applicant)
<p>TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights</p>	
1. Species	<p><i>Amaranthus</i> spp. L.. AMARANTH</p>
2. Applicant (Name and address)	
3. Proposed denomination or breeder's reference	

## 4. Information on origin, maintenance and reproduction of the variety

## 4.1 Origin

## 4.2 Other information

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

Characteristics

Example Varieties

Note

Characteristics

Example Varieties

Note

## 6. Similar varieties and differences from these varieties

7

Denomination of similar variety

Characteristic in which the similar variety is different <sup>o)</sup>

State of expression of similar variety

State of expression of candidate variety

<sup>o)</sup> In the case of identical states of expressions of both varieties, please indicate the size of the difference.

7. Additional information which may help to distinguish the variety

7.1 Resistances to pests and diseases

7.2 Special conditions for the examination of the variety

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 that question is yes, please attach a copy of such an authorization.

[End of document]