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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

ENLARGED EDITORIAL COMMITTEE

Geneva, January 6, 2011

DUS EXAMINATION OF SEED-PROPAGATED VARIETIES OF PAPAYA

Document prepared by the Office of the Union
(containing proposal prepared by an expert from Mexico)

1. The purpose of this document is to consider a proposal by the Leading Expert for the Test Guidelines for Papaya, Mr. Alejandro Barrientos-Priego (Mexico), for the DUS examination of seed-propagated varieties of Papaya, with a view to revising the Test Guidelines for Papaya to include seed-propagated varieties.

2. The structure of the document is as follows:

3. The following abbreviations are used in this document:

CAJ:	Administrative and Legal Committee
TC:	Technical Committee
TC-EDC:	Enlarged Editorial Committee
TWA:	Technical Working Party for Agricultural Crops
TWC:	Technical Working Party on Automation and Computer Programs
TWF:	Technical Working Party for Fruit Crops
TWO:	Technical Working Party for Ornamental Plants and Forest Trees
TWV:	Technical Working Party for Vegetables
TWPs:	Technical Working Parties

CONSIDERATION OF THE TEST GUIDELINES FOR PAPAYA BY THE TECHNICAL COMMITTEE

4. At its forty-sixth session, the TC considered document TG/PAPAYA(proj.6), which contained the following references to seed-propagated varieties:

"Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Carica papaya* L. of the family *Caricaceae*.

"2. Material Required

[..]

"2.2 The material is to be supplied in the form of seed or plants.

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

200 seeds in the case of seed-propagated varieties,
or 6 hermaphrodite plants in the case of vegetatively propagated varieties.

In the case of seed, the seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority.

[…]

"3.4 Test Design

"3.4.1 Each test should be designed to result in a total of at least 25 hermaphrodite plants in the case of seed-propagated plants or, in the case of vegetatively propagated varieties, in a total of at least 6 hermaphrodite plants or plant parts.

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

"3.5 Number of Plants / Parts of Plants to be Examined

"Unless otherwise indicated, all observations should be made on 25 hermaphrodite plants parts in the case of seed-propagated varieties or, in the case of vegetatively propagated varieties, on 6 hermaphrodite plants or plant parts.

"4.2 Uniformity

"4.2.2 For the assessment of uniformity for seed-propagated varieties, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 25 hermaphrodite plants, one off-type is allowed.

[…]"

5. The TC agreed to amend Chapter 1 to read "These Test Guidelines apply to vegetatively propagated varieties of *Carica papaya* L." and to make the necessary amendments in Chapters 2, 3, 4 and TQ 4. To invite the TC to consider how to address seed-propagated varieties. As explained in paragraph 1, the TC also agreed that the TWPs should be invited to consider how to address the DUS examination of seed-propagated varieties of Papaya on the basis of a document to be prepared by the Leading Expert, Mr. Alejandro Barrientos-Priego (Mexico), and the Office of the Union with a view to revising the Test Guidelines for Papaya to include seed-propagated varieties at the earliest opportunity. It also agreed that the Administrative and Legal Committee (CAJ) should be invited to consider that matter.

BACKGROUND INFORMATION

Situation in other Test Guidelines

6. In their consideration of seed-propagated varieties of papaya, the TWPs were invited to reflect on situations in other Test Guidelines where observations for characteristics are only made on certain plants within a variety. The following examples were provided:

Annex I: Test Guidelines for Hemp (document TG/CAN_SAT(proj.3))
Annex II: Test Guidelines for Carrot (document TG/49/8)

7. At the suggestion of the Technical Working Party for Agricultural Crops (TWA) and the Technical Working Party for Vegetables (TWV), the following examples have also been included in this document:

Annex III: Test Guidelines for Spinach (document TG/55/7)
Annex IV: Test Guidelines for Asparagus (document TG/130/4)

Explanation of seed-propagated varieties of Papaya

8. The Leading Expert for the Test Guidelines for Papaya, Mr. Alejandro Barrientos-Priego (Mexico)) provided the following explanation concerning seed-propagated varieties of Papaya:

9. The proposal in document TG/PAPAYA(proj.6) was that, for seed-propagated varieties, the description of the variety would be based only on hermaphrodite plants, although protection would be granted for the variety as a whole.

10. In general, there are three sex types in papaya seedlings: male, female and hermaphrodite. Those types cannot be distinguished at the seedling and vegetative stages of growth. In papaya, a selection of the appropriate sex type of the progeny is made for commercial planting because, in general, hermaphrodite plants are grown for fruit, due to their better size and elongated shape. In addition, the use of hermaphrodite plants is essential for seed production.

11. Papaya is grown in many countries as an annual crop because of papaya ringspot virus (PRSV), which is not transmitted by seed.

12. The sex homologues are designated as:

M	male
MH	hermaphrodite
m	female

13. All combinations of dominant alleles, such as MM, MHMH and MHM, are lethal to the zygote. This makes all males and hermaphrodites into enforced sex heterozygotes. Twenty-five percent of the seeds in their fruits are non-viable.

14. The genotypes for sex are:

Mm	male
MHm	hermaphrodite
mm	female

Recently, other lethal genes have been detected and the plants are only hermaphrodite.

15. The Technical Working Party for Fruit Crops, at its thirty-sixth session, held in Kôfu, Japan, from September 5 to 9, 2005, considered document TG/PAPAYA(proj.1) and agreed the use of only hermaphrodite plants. Therefore, it is proposed that the matter be considered in particular, in relation to this specific case.

PROPOSAL BY THE LEADING EXPERT FOR THE DUS EXAMINATION OF SEED-PROPAGATED VARIETIES OF PAPAYA

16. On the basis that the male, hermaphrodite and female plants cannot be distinguished at the vegetative stage, the Leading Expert for the Test Guidelines for Papaya, Mr. Barrientos-Priego (Mexico) proposed that the vegetative characteristics could be recorded on all those types of plants. However, on the basis that the expression of inflorescence and fruit characteristics differs greatly between female and hermaphrodite plants, it is proposed that the observations for inflorescence and fruit characteristics be made only on hermaphrodite plants.

COMMENTS OF THE TECHNICAL WORKING PARTIES

Technical Working Party for Agricultural Crops

17. At its thirty-ninth session, held in Osijek, Croatia, from May 24 to 28, 2010, the Technical Working Party for Agricultural Crops (TWA) considered document TWA/39/25 (see document TWA/39/27 “Report”, paragraphs 79 to 81).

18. The TWA agreed with the approach proposed by the Leading Expert for the Test Guidelines for Papaya, as set out in document TWA/39/25, paragraph 11 (paragraph 16 of this document). In that regard, it agreed that, in Chapter 3.4, it would be important to specify the number of plants that would need to be sown in order to achieve 25 hermaphrodite plants. It also agreed that it might be appropriate to consider the addition of a characteristic for the proportion of male plants, female plants and hermaphrodite plants in the variety, if that

characteristic would fulfill the requirements for a characteristic set out in the General Introduction.

19. In order to assist other experts in their consideration of the proposal, the TWA agreed that it would be useful to provide information on the method of propagation of varieties of papaya. It was also agreed that reference might be made to the Test Guidelines for Spinach (document TG/55/7) in an additional annex to the document, with particular regard to the following characteristics:

Proportion of monoecious plants (characteristic 12)
Proportion of female plants (characteristic 13)
Proportion of male plants (characteristic 14)

Technical Working Party for Vegetables

20. The Technical Working Party for Vegetables (TWV), at its forty-fourth session, held in Veliko Tarnovo, Bulgaria, from July 5 to 9, 2010, considered document TWV/44/25 (see document TWV/44/34 "Report", paragraphs 88 to 90).

21. The TWV noted that the situation in Carrot (Annex II to this document) was not quite the same as that with Papaya, because the characteristic "Plants: proportion of male sterile plants" was examined in a special test and all other characteristics were examined on all plants of the variety. However, it agreed that the situation for Asparagus and Spinach was similar to that for Papaya. In that regard, it noted that all the plants of those varieties were observed and a description was made to cover all plants. The TWV agreed that the approach proposed for Papaya by the Leading Expert, as set out in document TWV/44/25, paragraph 11 (paragraph 16 of this document), might be interesting for crops such as Asparagus and Spinach. The TWV noted that a similar situation existed in varieties of *Matthiola incana*, where there were single- and double-flowered plants within a variety.

22. An expert from the International Seed Federation (ISF) requested clarification on what was protected if only certain plants of a variety were described and wondered whether the female plants in such a seed-propagated Papaya variety could be vegetatively propagated and protected as a new variety. In that regard, it was noted that such a vegetatively propagated variety could probably be considered as a new variety (e.g. on the basis of a characteristic for the proportion of male plants, female plants and hermaphrodite plants in the variety), irrespective of whether all the plants in the seed-propagated variety were described, or only the hermaphrodite plants. The TWV also noted that the vegetative characteristics could be recorded on all plants and it was only the inflorescence and fruit characteristics that were proposed to be observed only on hermaphrodite plants.

Technical Working Party for Ornamental Plants and Forest Trees

23. The TWO, at its forty-third session, held in Cuernavaca, Morelos State, Mexico, from September 20 to 24, 2010, agreed with the approach proposed by the Leading Expert for the Test Guidelines for Papaya, as set out in document TWO/43/27, paragraph 11 (paragraph 16 of this document). It noted that there would be no obstacle to develop additional characteristics for male plants, for example, if that would be useful (see document TWO/43/29 Rev. "Report", paragraph 88).

Technical Working Party for Fruit Crops

24. The TWF considered document TWF/41/27, as presented by Mr. Alejandro Barrientos-Priego (Mexico). The TWF agreed with the approach proposed by the Leading Expert for the Test Guidelines for Papaya, as set out in document TWF/41/27, paragraph 11 (paragraph 16 of this document) and also agreed with the TWA that, in Chapter 3.4, it would be important to specify the number of plants that would need to be sown in order to achieve 25 hermaphrodite plants. It also agreed with the TWA that it might be appropriate to consider the addition of a characteristic for the proportion of male plants, female plants and hermaphrodite plants in the variety, if that characteristic would fulfill the requirements for a characteristic set out in the General Introduction.. It also noted that there would be no obstacle to develop additional characteristics for male plants and female plants if that would be useful (see document TWF/41/30 Rev. "Report", paragraphs 60 and 61).

CONSIDERATION BY THE ADMINISTRATIVE AND LEGAL COMMITTEE

25. The Administrative and Legal Committee (CAJ), at its sixty-second session, held in Geneva on October 18 and 19, 2010, noted that the TC, at its forty-sixth session, held in Geneva from March 22 to 24, 2010, had agreed that the Test Guidelines for Papaya should be adopted on the basis that they would apply to vegetatively propagated varieties. The CAJ noted that the TC had agreed that the TWPs should be invited to consider how to address the DUS examination of seed-propagated varieties of Papaya on the basis of a document to be prepared by the Leading Expert, Mr. Alejandro Barrientos-Priego (Mexico), and the Office of the Union with a view to revising the Test Guidelines for Papaya to include seed-propagated varieties at the earliest opportunity. The CAJ also noted that the TC had further agreed that the CAJ should be invited to consider that matter (see document TC/46/15 "Report on the Conclusions", paragraph 99). The CAJ agreed to consider that matter at its sixty-fourth session to be held in Geneva in October 2011 (see document CAJ/62/8 "Report on the Conclusions", paragraph 25) .

[Annexes follow]

ANNEX I

Extract from

TEST GUIDELINES FOR HEMP (DOCUMENT TG/CAN_SAT(PROJ.3))

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

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
12. (*) (+)	**2101 2304 MG**	**Time of male flowering**					
QN		very early				Finola	1
		early				Ruby	3
		medium				Tiborszállási	5
		late				Kompolti	7
		very late					9
13.	**2102 2304 VG**	**Inflorescence: anthocyanin coloration of male flowers**					
QN		absent or very weak				Kompolti	1
		weak				Carmen	3
		medium				Lovrin 110	5
		strong					7
		very strong					9
14. (*) (+)	**2202 2203 2302 2305 MG**	**Inflorescence: THC content**					
QN	**(b)**	absent or very low				Santhica 23, Hlera, Glukhovskaya 33	1
		low to medium				Férimon, Carmen, Uso 31	2
		medium to very high				Krasnodarskaya, Medisins, Grace	3

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
15. (*) (+)	**2102 2202 2302 2304 VS**	**Plant: proportion of monoecious plants**					
QN		absent or very low					1
		low					3
		medium					5
		high					7
		very high					9
16. (*) (+)	**2102 2202 2302 2304 VS**	**Plant: proportion of female plants**					
QN		absent or very low					1
		low					3
		medium					5
		high					7
		very high					9
17. (*) (+)	**2102 2202 2302 2304 VS**	**Plant: proportion of male plants**					
QN		absent or very low					1
		low					3
		medium					5
		high					7
		very high					9

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
18. (*) (+)	**2202 2302 VG/ MG**	**Plant: natural height**					
QN	**(b)**	short				Carmen, Uso 31, Finola	3
		medium				Glukhovskaya 33	5
		long				Dneprovskaya 11	7
19. (*)	**2202 2302 VG**	**Main stem: color**					
PQ	**(b) (c)**	yellow				Chamaeleon, Glukhovskaya 10	1
		medium green				Tiborszállási, Hlera	2
		dark green				Kompolti, Zolotonoshskaya 11	3
		purple				Fibranova	4
20.	**2202 2302 MS**	**Main stem: length of internodes**					
QN	**(b) (c)**	short				Finola, Fasamo	3
		medium				Ruby, Sinelnikovskaya 3	5
		long				Dneprovskaya 11	7
21.	**2202 2302 MS/ VG**	**Main stem: thickness**					
QN	**(b) (c)**	thin				Carmen	1
		medium				Dneprovskaya 11	2
		thick				Carmagnola, Deni	3

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
22.	**2202 2302**	**Main stem: number of grooves**					
(+)	**VG**						
QN	**(b) (c)**	few					1
		medium				Fedora 17, FibreGem	2
		many				Uso 31, Ruby	3
23.	**2204 2306**	**Main stem: pith in cross-section**					
(+)	**VG**						
QN	**(b)**	absent or very thin					1
		medium					2
		thick				Deni	3

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

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

(a) Observations should be done on the last opposite, fully expanded leaves
(b) Male plants should be excluded from the observation
(c) Observations should be done on the middle third part of the plant.

[Annex II follows]

ANNEX II

Extract from

TEST GUIDELINES FOR CARROT (DOCUMENT TG/49/8)

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

		English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
31. (*) (+)	**VS**	**Plants: proportion of male sterile plants**	**Plantes: proportion de plantes mâles stériles**	**Pflanzen: Anteil männlich steriler Pflanzen**	**Plantas: proporción de plantas androestériles**		
QN	**(c)**	absent or very low	nulle ou très faible	fehlend oder sehr gering	ausente o muy baja	Nantaise améliorée 2, Touchon	1
		intermediate	intermédiaire	mittel	intermedio		2
		high	forte	hoch	alta	Nanco, Tino	3
32. (*) (+)	**VS**	**Plant: type of male sterility**	**Plante: type de stérilité mâle**	**Pflanze: Typ der männlichen Sterilität**	**Planta: tipo de androestérilidad**		
QL	**(c)**	brown anther	anthères brunes	braune Antheren	antera marrón	Nanco	1
		petaloid anther	anthères pétaloïdes	petaloide Antheren	antera petaloide	Tino	2

[Annex III follows]

ANNEX III
Extracts from

TEST GUIDELINES FOR SPINACH (DOCUMENT TG/55/7)

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

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
12. (*) (+)	**VS**	**Proportion of monoecious plants**	**Proportion de plantes monoïques**	**Anteil monözischer Pflanzen**	**Proporción de plantas monoicas**		
QN		absent or very low	absente ou très faible	fehlend oder sehr gering	ausente o muy baja	Medania	1
		low	faible	gering	baja	Matador	3
		medium	moyenne	mittel	media	Figo	5
		high	grande	hoch	alta	Giraffe, Lazio	7
		very high	très grande	sehr hoch	muy alta	Monnopa	9
13. (*) (+)	**VS**	**Proportion of female plants**	**Proportion de plantes femelles**	**Anteil weiblicher Pflanzen**	**Proporción de plantas femeninas**		
QN		absent or very low	absente ou très faible	fehlend oder sehr gering	ausente o muy baja	Monnopa	1
		low	faible	gering	baja	Giraffe	3
		medium	moyenne	mittel	media	Figo, Medania	5
		high	grande	hoch	alta	Parrot	7
		very high	très grande	sehr hoch	muy alta		9
14. (*) (+)	**VS**	**Proportion of male plants**	**Proportion de plantes mâles**	**Anteil männlicher Pflanzen**	**Proporción de plantas masculinas**		
QN		absent or very low	absente ou très faible	fehlend oder sehr gering	ausente o muy baja	Monnopa, Parrot	1
		low	faible	gering	baja		3
		medium	moyenne	mittel	media	Medania	5
		high	grande	hoch	alta		7
		very high	très grande	sehr hoch	muy alta		9

8. Explanations on the Table of Characteristics

8.2 Explanations for individual characteristics

Ad. 12: Proportion of monoecious plants
Ad. 13: Proportion of female plants
Ad. 14: Proportion of male plants

Observations on the proportion of monoecious, female or male plants should be made at the beginning of seed setting. The three groups are defined as follows:

Monoecious plants: plants which have both male flowers and female flowers (seeds clearly visible);

Female plants: plants which have only female flowers (seeds clearly visible);

Male plants: plants which have only male flowers.

	Note	Approximate percentage
absent or very low	1	< 10%
	2	20%
low	3	30%
	4	40%
medium	5	50%
	6	60%
high	7	70%
	8	80%
very high	9	> 90%

[Annex IV follows]

ANNEX IV
Extracts from

TEST GUIDELINES FOR ASPARAGUS (DOCUMENT TG/130/4)

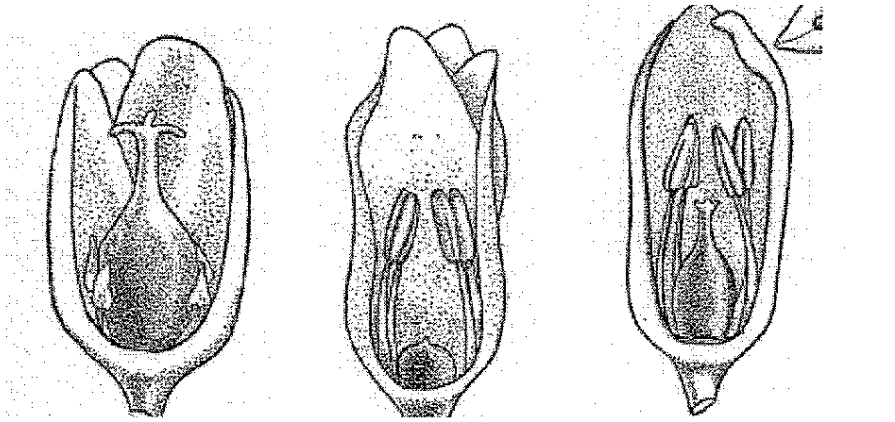
8. Table of Characteristics/Tableau des caractères/Merkmalstabelle/Tabla de caracteres

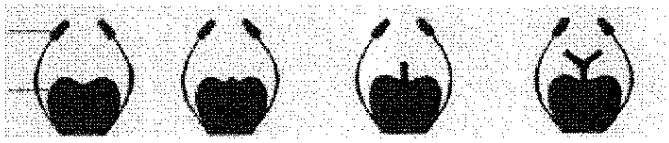
		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16. (+) (*)	**VG**	**Type of flowering**	**Type de floraison**	**Blühtyp**	**Tipo de floración**		
QL		plants with male flowers and plants with female flowers	plantes avec des fleurs mâles et plantes avec des fleurs femelles	Pflanzen mit männlichen Blüten und Pflanzen mit weiblichen Blüten	plantas con flores masculinas y plantas con flores femeninas	Andreas	1
		plants with male and female flowers	plantes avec des fleurs mâles et des fleurs femelles	Pflanzen mit männlichen und weiblichen Blüten	plantas con flores masculinas y femeninas	Argenteuil, Desto	2
		plants with androhermaphrodite flowers and plants with male flowers with style rudiments	plantes avec des fleurs androhermaphrodites et plantes avec des fleurs mâles avec rudiments de style	Pflanzen mit männlich-zwittrigen Blüten und Pflanzen mit männlichen Blüten mit Griffelrudimenten	plantas con flores hermafroditas masculinas y plantas con flores masculinas con estilo	Backlim, Gijnlim	3

8. Explanations on the Table of Characteristics

8.2 Explanations for individual characteristics

Ad. 16: Type of flowering





Type of male flowers: the flowers always have fully developed anthers; the style can be from absent to fully developed, but the stigmas are always rudimentary or absent. Even when two of the three stigmas are present, the flower is considered to be male. The male flower will not produce seeds.

The androhermaphrodite flower has three stigmas and anthers which produce pollen. The flower has the possibility, when self-pollinated, to produce a berry with some seeds.

[End of Annex IV and of document]