



**TWF/41/27**

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

**TECHNICAL WORKING PARTY FOR FRUIT CROPS**

**Forty-First Session**

**Cuernavaca, Morelos State, Mexico**

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DUS EXAMINATION OF SEED-PROPAGATED VARIETIES OF PAPAYA

*Document prepared by Mexico and the Office of the Union*

## CONSIDERATION BY THE TECHNICAL COMMITTEE

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

<p><u>“Subject of these Test Guidelines</u></p> <p>These Test Guidelines apply to all varieties of <i>Carica papaya</i> L. of the family <i>Caricaceae</i>.</p> <p>“2. <u>Material Required</u></p> <p>[.]</p> <p>“2.2 The material is to be supplied in the form of seed or plants.</p> <p>“2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:</p> <p style="text-align: center;">200 seeds in the case of seed-propagated varieties, or 6 hermaphrodite plants in the case of vegetatively propagated varieties.</p> <p>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.</p> <p>[...]</p> <p>“<u>3.4 Test Design</u></p> <p>“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.</p> <p>“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.</p> <p>“<u>3.5 Number of Plants / Parts of Plants to be Examined</u></p> <p>“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.</p> <p>“<u>4.2 Uniformity</u></p> <p>“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.</p> <p>[...]”</p>
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2. 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 CAJ should be invited to consider that matter.

## BACKGROUND INFORMATION

### *Explanation by Leading Expert (Alejandro Barrientos-Priego (Mexico))*

3. 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.

4. 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.

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

6. The sex homologues are designated as:

M	male
MH	hermaphrodite
m	female

7. 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.

8. The genotypes for sex are:

Mm	male
MHm	hermaphrodite
mm	female

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

9. 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

10. On the basis that the male, hermaphrodite and female plants cannot be distinguished at the vegetative stage, it is 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.

## SITUATION IN OTHER TEST GUIDELINES

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

Annex I: Test Guidelines for Hemp (document TG/CAN\_SAT(proj.3))

Annex II: Test Guidelines for Carrot (document TG/49/8)

## COMMENTS OF THE TECHNICAL WORKING PARTIES AT THEIR SESSIONS IN 2010

### Technical Working Party for Agricultural Crops

12. 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).

13. 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 11 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.

14. 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

15. 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).

16. 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 11 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.

17. 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 were proposed to be observed only on hermaphrodite plants.

[Annexes follow]

## ANNEX I

Extract from

## TEST GUIDELINES FOR HEMP (DOCUMENT TG/CAN\_SAT(PROJ.3))

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota	
<b>12.</b>	<b>2101</b>	<b>Time of male</b>					
(*)	<b>2304</b>	<b>flowering</b>					
(+)	<b>MG</b>						
<b>QN</b>	very early				Finola	1	
	early				Ruby	3	
	medium				Tiborszálási	5	
	late				Kompolti	7	
	very late					9	
<b>13.</b>	<b>2102</b>	<b>Inflorescence:</b>					
	<b>2304</b>	<b>anthocyanin</b>					
	<b>VG</b>	<b>coloration of male</b>					
		<b>flowers</b>					
<b>QN</b>	absent or very weak				Kompolti	1	
	weak				Carmen	3	
	medium				Lovrin 110	5	
	strong					7	
	very strong					9	
<b>14.</b>	<b>2202</b>	<b>Inflorescence: THC</b>					
(*)	<b>2203</b>	<b>content</b>					
(+)	<b>2302</b>						
	<b>2305</b>						
	<b>MG</b>						
<b>QN</b>	(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
<b>15.</b>	<b>2102</b>	<b>Plant: proportion of</b>				
(*)	<b>2202</b>	<b>monoecious plants</b>				
(+)	<b>2302</b>					
	<b>2304</b>					
	<b>VS</b>					
<b>QN</b>	absent or very low					1
	low					3
	medium					5
	high					7
	very high					9
<b>16.</b>	<b>2102</b>	<b>Plant: proportion of</b>				
(*)	<b>2202</b>	<b>female plants</b>				
(+)	<b>2302</b>					
	<b>2304</b>					
	<b>VS</b>					
<b>QN</b>	absent or very low					1
	low					3
	medium					5
	high					7
	very high					9
<b>17.</b>	<b>2102</b>	<b>Plant: proportion of</b>				
(*)	<b>2202</b>	<b>male plants</b>				
(+)	<b>2302</b>					
	<b>2304</b>					
	<b>VS</b>					
<b>QN</b>	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	
<b>18.</b>	<b>2202</b>	<b>Plant: natural height</b>					
(*)	<b>2302</b>						
(+)	<b>VG/ MG</b>						
<b>QN</b>	(b)	short			Carmen, Uso 31, Finola	3	
		medium			Glukhovskaya 33	5	
		long			Dneprovskaya 11	7	
<b>19.</b>	<b>2202</b>	<b>Main stem: color</b>					
(*)	<b>2302</b>						
	<b>VG</b>						
<b>PQ</b>	(b)	yellow			Chamaeleon, Glukhovskaya 10	1	
	(c)	medium green			Tiborszálási, Hlera	2	
		dark green			Kompolti, Zolotonoshskaya 11	3	
		purple			Fibranova	4	
<b>20.</b>	<b>2202</b>	<b>Main stem: length of</b>					
	<b>2302</b>	<b>internodes</b>					
	<b>MS</b>						
<b>QN</b>	(b)	short			Finola, Fasamo	3	
	(c)	medium			Ruby, Sinelnikovskaya 3	5	
		long			Dneprovskaya 11	7	
<b>21.</b>	<b>2202</b>	<b>Main stem: thickness</b>					
	<b>2302</b>						
	<b>MS/ VG</b>						
<b>QN</b>	(b)	thin			Carmen	1	
	(c)	medium			Dneprovskaya 11	2	
		thick			Carmagnola, Deni	3	



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

## 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]

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

	English	français	Deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
<b>31. VS</b> (*) (+)	<b>Plants: proportion of male sterile plants</b>	<b>Plantes: proportion de plantes mâles stériles</b>	<b>Pflanzen: Anteil männlich steriler Pflanzen</b>	<b>Plantas: proporción de plantas androestériles</b>		
<b>QN</b>	(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
<b>32. VS</b> (*) (+)	<b>Plant: type of male sterility</b>	<b>Plante: type de stérilité mâle</b>	<b>Pflanze: Typ der männlichen Sterilität</b>	<b>Planta: tipo de androestérilidad</b>		
<b>QL</b>	(c) brown anther	anthères brunes	braune Antheren	antera marrón	Nanco	1
	petaloid anther	anthères pétaloïdes	petaloide Antheren	antera petaloide	Tino	2

[End of Annex II and of document]