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FRUIT CROPS**

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**WORKING PAPER ON TEST GUIDELINES FOR PRICKLY PEAR  
(*Opuntia* spp.)**

*Document prepared by experts from Mexico*

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## I. Subject of these Guidelines

These Test Guidelines apply to all vegetatively propagated varieties of *Opuntia* spp. (Cactaceae).

## II. Material Required

1. The competent authorities decide when, where and in what quantity and quality the plant material 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. As a minimum, the following quantity of plant material is recommended:

8 plants of one year old.

If accepted by the competent authority, the applicant could submit:

- 10 cladodes with more than one year-old, sufficient to propagate 8 plants.
2. The plant material supplied should be visibly healthy, not lacking in vigor or affected by any important pests or diseases.
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. To assess distinctness, it is essential for the plants under test to bear a satisfactory crop of fruit for at least two 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. Each test should include a total of 8 plants. Separate plots for observation and for measuring can only be used if they have been subject to similar environmental conditions.
4. The prickly pears items can be separated in two groups as follows:

Fruits with thick peel derived from the receptacle of wide flowers, seeds disposed in the central part, dry funiculus, two flowerings a year, persistence of fruit up to 6 or 8 months, juicy and acid:

*Xoconostles* (*Opuntia joconostle*, *O. matudae*, *O. oligacantha*, *O. leucotrica*, *O. hielabravoana*, *O. spinulifera*).

Fruits with medium peel and insipid and occupy 1/4 to 2/4 of the total thickness of the total fruit, the seeds are disposed in all the flesh, funiculus filled with sugars, sweet, flowering once a year, the fruit is persistence from 1 to 2 months:

Prickly pear (*Opuntia* spp.).

5. Additional tests for special purposes may be established.

#### IV. Methods and Observations

1. All observations should be made on 5 plants or 10 parts, 2 from each of 5 plants, with the exception of the observations on fruit, which should be made on at least 20.
2. For the assessment of uniformity a population standard of 1% with an acceptance probability of at least 95% should be applied. In the case of a sample size of 5 plants, the maximum number of off-types allowed would be 1.
3. All observations done on cladode should be mature of an age of 1 or 2 years old. These without any injury caused by biotic and/or abiotic factors.
4. All observations of the characteristics of areola spines and glochides should be made with the help of a stereoscopic microscope.
5. All observations in the flower should be made on maximum flowering time. All observations in flower must be in its first opening.
6. All observations on the fruit should be made on 20 fully mature fruits.
7. The observations of fruit diameter, peel thickness, acidity and total soluble solids should be made in the middle of the fruit.

#### 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.
2. It is recommended that the competent authorities use the following characteristics for grouping varieties:
  - (a) Cladode: areole color (characteristic 16)
  - (b) Fruit: seed size (characteristic 62)
  - (c) Fruit: harvest time (characteristic 64).

## VI. Characteristics and Symbols

1. To assess distinctness, uniformity and stability, the characteristics and their states as given in the Table of Characteristics should be used.

2. Notes (numbers), 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 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 on the Table of Characteristics in Chapter VIII.

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

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>1. Plant: growth habit (+)</b>			<b>Planta: hábito de crecimiento</b>		
upright			erecto	Cardón	1
spreading			extendido	Chapeado, Cristalina	2
decumbent			decumbente	Pabellón, Rojo Pelón	3
<b>2. Plant: shape</b>			<b>Planta: forma</b>		
flat (width>height)			aplanada (ancho>altura)	Pabellón	3
rounded (width=height)			redonda (ancho=altura)	Cristalina	5
elongated (width<height)			alargado (ancho<altura)	Rubí Reyna	7
<b>3. Plant: height</b>			<b>Planta: altura</b>		
small			pequeño	Tapona de Mayo	3
medium			mediana	Cristalina	5
large			grande	Rubí Reyna, Alfajayucan	7
<b>4. Plant: alternate bearing</b>			<b>Planta: alternancia en la producción</b>		
absent			ausente	Rojo Vigor, Solferino	1
present			presente	Frida	9
<b>5. Cladode: shape (+)</b>			<b>Cladodio: forma</b>		
round			redondo	Tapón	1
elliptic			elíptico	Alfajayucan	2
narrow obovate			estrecho obovado	Tlaconopal	3
obovate			obovado	Rubí Reyna	4
rhombic			rómbico	Trompa de Cochino	5

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>6.</b>	<b>Cladode: shape</b>		<b>Cladodio: forma</b>		
(+)					
	round		redondo	Tapón	1
	elliptic		elíptico	Alfajayucan	2
	narrow obovate		estrecho obovado	Tlaconopal	3
	obovate		obovado	Rubí Reyna	4
	rhombic		rómbico	Trompa de Cochino	5
<b>7.</b>	<b>Cladode: color</b>		<b>Cladodio: color</b>		
	“pistachio” green ??		verde “pistache” ??	Pelón Rojo	1
	yellow green		verde amarillo	Cascarón	3
	light green		verde claro	Tapón de Mayo	2
	medium green		verde	Blanca Pepina	4
	dark green		verde obscuro	Morado Jalpa	5
<b>8.</b>	<b>Cladode: surface</b>		<b>Cladode: superficie</b>		
	waxy		cerosa	Alfajayucan	1
	glabrous		glabra	Joconostle	2
	tomentose		tomentosa	Pachón	3
	pruinose		pruinoso	Crasa	4
<b>9.</b>	<b>Cladode: edge</b>		<b>Cladodio: borde</b>		
	not wavy		no ondulada	Alfajayucan	1
	wavy		ondulada	Bola de Masa	2
<b>10.</b>	<b>Cladode: length</b>		<b>Cladodio: longitud</b>		
(+)					
	short		corta	Pico Chulo, Pabellón	3
	medum		media	Cristalina, Chapeada	5
	long		largo	Amarilla Montesa, COPENA V-1	7

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>11. Cladode: width (+)</b>			<b>Cladodio: anchura</b>		
narrow			estrecha	Rubí Reyna, Sanjuanera	3
medium			media	Amarilla Montesa, COPENA T-5	5
broad			ancha	Naranjón Legítimo, Mango	7
<b>12. Cladode: surface area</b>			<b>Cladodio: área de la superficie</b>		
small			pequeña	Pabellón, Sanjuanera	3
medium			media	Morada, COPENA T-5	5
large			grande	Cristalina, Charaola Tardía	7
<b>13. Cladode: thickness (* )</b>			<b>Cladodio: grosor</b>		
thin			delgado	COPENA T-2, Rubí Reyna	3
medium			medio	Amarilla Montesa, Sanjuanera	5
thick			grueso	Pabellón, Mango	7
<b>14. Cladode: density of areoles on the apex</b>			<b>Cladodio: densidad de areolas en el ápice</b>		
very low			muy baja		1
low			baja	Pico Chulo, Amarilla Montesa	3
medium			media	Alfajayucan, Mango	5
high			alta	Rubí Reyna, Amarrillo	7
very high			muy alta	Charola, Morada	9



English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>15.</b>	<b>Cladode: areoles in the center row</b>		<b>Cladode: areolas en la hilera del centro</b>		
	few		pocas	Fafayuco	3
	medium		media	Rubí Reyna, Mango	5
	many		muchas	Charola, Sangre de Toro	7
<b>16. (*)</b>	<b>Cladode: areole color</b>		<b>Cladodio: color de la areola</b>		
	white		blanco	Milpa Alta	1
	gray		gris	Alfajayucan	2
	yellow brown		amarillo marrón	Burrona	4
	brown		marrón	Chaveña	3
	black		negro	Pico Chulo	5
<b>17. (*)</b>	<b>Cladode: spines per areole</b>		<b>Cladodio: espinas por areola</b>		
	absent or very few		ausentes	Pabellón, Rojo Pelón	1
	few		pocas	Naranjón Legítimo	3
	medium		media	Cristalina, Chapeado	5
	abundant		abundantes	Sanjuanera	7
	very abundant		muy abundantes		9
<b>18. (+)</b>	<b>Cladode: spine attitude</b>		<b>Cladodio tipo de espinas</b>		
	erect		erectas	Chaveña	1
	semi-erect		semi-erecto	Cardón durazno	2
	horizontal		horizontales	Cascarón	3
	erect and horizontal		erecta y horizontal		4
	semi-erect and horizontal		semi-erecto y horizontal		5

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>19. Cladode: spine color</b>			<b>Cladodio: color de la espina</b>		
white with yellow tip			blanca con punta amarilla	Chapeado	1
white			blanco	Alfajayucan	2
yellow			amarillo	Nopal Rubio, Duraznillo	3
light brown			marrón claro	Rosa de Castilla	4
dark brown			marrón oscuro	San Pedreña	5
gray with yellow tip			gris con punta amarilla	Cardón Blanco	6
<b>20. Cladode: length of the bigger spine</b>			<b>Cladodio: longitud de la espina más grande</b>		
short			corta	Cristalina	3
medium			media	Pico Chulo, Montesa	5
long			larga	Sanjuanera	7
<b>21. Cladode: spine texture</b>			<b>Cladodio: textura de la espina</b>		
longitudinal grooves			estrías longitudinales	Alfajayucan	1
transversal grooves			estrías transversales		2
smooth			lisa	Amarillo	3
pruinose			pruinosa		4
<b>22. (*) Cladode: central spine consistency</b>			<b>Cladodio: consistencia de la espina central</b>		
flexible			flexible	Amarillo	1
hard			dura	Alfajayucan	2
brittle			quebradiza	Burrona	3

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>23. Cladode: central spine shape</b>			<b>Cladodio: forma de la espina central</b>		
acicular			aciculares	Alfajayucan	1
compressed			aplanada	Amarilla	2
cylindrical			cilíndricas	Amarilla montesa	3
triangular			triangular	Pachón	6
<b>24. Cladode: central spine type</b>			<b>Cladodio: tipo de la espina central</b>		
straight			rectas	Amarrillo	5
curved			curvadas	Blanco Chinchilla	4
twisted			torcidas	Chaveña, Chapeada	7
<b>25. Cladode: spine shape in cross section</b>			<b>Cladodio: forma en la sección transversal de la espina</b>		
flattened			Aplanada	Amarilla	1
round			redonda	Lasia	2
semi-rounded			Semi-redonda	Alfajayucan	3
elliptic			elíptica		4
square			cuadrada		5
triangular			triangular		6
<b>26. Cladode: glochides (*)</b>			<b>Cladodio: glóquidas</b>		
absent			ausentes	Blanca Pepina	1
few			pocas	Blanca San José	3
medium			media		5
abundant			abundantes	Tuna Mantequilla	7
very abundant			muy abundantes		9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>27. Cladode: glochides color</b>			<b>Cladodio: color de glóquidas</b>		
yellow			amarillas	Amarilla	1
cream			crema	Sangre de Toro	2
brown			marrón	Café	3
orange			anaranjadas	Meloncillo	4
reddish			rojizas	Pachón	5
<b>28. Flowering: time</b>			<b>Floración: tiempo</b>		
early			temprano	Pico Chulo, Sanjuanera	3
medium			medio	Chapeada	5
late			tardío	Burrona, Charola, Cristalina	7
<b>29. Flowering: habit (*)</b>			<b>Floración: hábito</b>		
once flowering			una floración	Pico Chulo	1
twice flowering			doble floración	Joconostle	2
<b>30. Flower: number on one year-old cladode</b>			<b>Flor: número en cladodios de un año de edad</b>		
few			pocos		3
medium			medio		5
many			muchos		7
<b>31. Flower: length (+)</b>			<b>Flor: longitud</b>		
short			corta	Cristalina	3
medium			media	Pico Chulo, Montesa	5
long			larga	Rubí Reyna, Morada Jalpa	7

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>32. (+) Flower: length of the receptacle</b>			<b>Flor: longitud del receptáculo</b>		
short			corta	Bola de Masa	3
medium			media	Pico Chulo, Cristalina	5
long			largo	Rubí Reyna, Morada Jalpa, Mango	7
<b>33. (+) Flower: width of the receptacle</b>			<b>Flor: ancho del receptáculo</b>		
narrow			estrecho	COPENA T-14, Sanjuanera	3
medium			media	Pico Chulo, Amarilla Montesa	5
wide			amplio	Cristalina, Mango	7
<b>34. Flower: periant color</b>			<b>Flor: color del perianto</b>		
greenish yellow			amarillo verdoso	Crasa	1
yellow			amarillo	Tapón Macho	2
golden			dorado	Rojo Pelón	3
orange			anaranjado	Alfajayucan, Chapeado	4
red			rojo	Tuna Rosa	5
<b>35. (+) Flower: stigma lobe number</b>			<b>Flor: número de lóbulos del estigma</b>		
few			pocos	Colorada, Sanjuanera	1
medium			media	Cristalina, Pabellón	3
many			muchos	Memelo, Rubí Reyna	5

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>36. Flower: stigma lobe color</b> (+)			<b>Flor: color de los lóbulos del estigma</b>		
yellow			amarillos	Morada jalpa	1
green			verdes	Alfajayucan, cristalina	2
greenish			verdusco	Pachón	3
<b>37. Flower: style color</b> (* (+)			<b>Flor: color del estilo</b>		
white			blanco	Amarilla Montesa	1
yellow			amarillo	Cardona	2
green			verde	Crasa	3
pink			rosa	Pico Chulo, Morada	4
red			rojo	Rojo Pelón, Pabellón	5
<b>38. Flower: style length</b>			<b>Flor: longitud del estilo</b>		
short			corto		3
medium			mediano	Alfajayucan	5
long			largo	Morada Jalpa	7
<b>39. Fruit: length</b>			<b>Fruto: longitud</b>		
short			corto	Tapona de Mayo	3
medium			mediano	Rojo Pelón	5
long			largo	Rubí Reyna, Burrona	7
<b>40. Fruit: diameter</b>			<b>Fruto: diámetro</b>		
small			pequeño	Rubí reyna	3
medium			mediano	Rojo pelón	5
large			grande	Tapona de Mayo, Burrona	7

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>41. Fruit: shape</b>			<b>Fruto: forma</b>		
compressed			comprimido	Tapón de Mayo	1
spheroid			esferoide	Cardona	2
ellipsoid			elipsoide	Alfajayucan	3
narrow ellipsoid			elipsoide angosto	Rubí Reina	4
oblong			oblongo	Frida	5
obovoid			obovoide	Roja Jalpa	6
<b>42. Fruit: length</b>			<b>Fruto: longitud</b>		
short			corto	Tapona de Mayo	3
medium			medio	Rojo Pelón	5
long			largo	Rubí Reyna, Burrona	7
<b>43. Fruit: width</b>			<b>Fruto: ancho</b>		
small			pequeño	Rubí Reyna	3
medium			mediano	Rojo Pelón	5
large			grande	Tapón de Mayo, Burrona	7
<b>44. Fruit: ratio length/diameter</b>			<b>Fruto: relación longitud/diámetro</b>		
small			pequeño	Alfajayucan, Burrona	3
medium			mediano	Blanca de Castilla	5
large			grande	Rubí Reyna	7
<b>45. Fruit: size</b>			<b>Fruto: tamaño</b>		
very small			muy pequeño	Cardón	1
small			pequeño	Pico Chulo	3
medium			mediano	Alfajayucan	5
large			grande	Amarilla Montesa	7
very large			muy grande	Burrona, Cristalina	9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>46. Fruit: peel thickness</b>			<b>Fruto: grosor de cáscara</b>		
small			pequeño	COPENA T-5, Alfajayucan	3
medium			mediano	Amarilla Montesa, Cristalina	5
large			grande	Burrona, Mango	7
<b>47. Fruit: peel weight</b>			<b>Fruto: peso de cáscara</b>		
small			pequeño	COPENA T-5, Alfajayucan	3
medium			mediano	Amarilla Montesa, Cristalina	5
large			grande	Burrona, Chapeada	7
<b>48. Fruit: mesocarp weight</b>			<b>Fruto: peso de mesocarpio</b>		
small			pequeño	Charola	3
medium			mediano	Pico Chulo, chapeado	5
large			grande	Amarillo montesa, Naranjón Legítimo	7
very large			muy grande	Burrona, Cristalina	9
<b>49. Fruit: ratio peel/mesocarp</b>			<b>Fruto: relación cáscara/mesocarpio</b>		
small			pequeño	Alfajayucan, Cristalina	3
medium			mediano	Fafayuco, Cahpeado	5
large			grande	Cascarón	7
<b>50. Fruit: color uniformity</b>			<b>Fruto: uniformidad de color</b>		
absent			ausente	Chapeado	1
present			presente	Burrona, Cristalina	9



English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>51. Fruit: peel color (* )</b>			<b>Fruto: color de cáscara</b>		
white			blanca	Blanca Platanillo	1
light green			verde claro	Gavia	2
green			verde	Burrona	3
yellow			amarilla	Amarilla Plátano	4
dark yellow			amarillo oscuro	Amarilla Montesa	5
orange			naranja	Naranjón, Pico Chulo	6
pink			rosa	Memelo	7
red			roja	Rubí Reyna	8
dark red			rojo oscuro	Cardona	9
purple			púrpura	Pachón, Morada	10
<b>52. Fruit: pulp color</b>			<b>Fruto: color de pulpa</b>		
cream			crema	Blanca San José	1
light green			verde claro	Burrona	2
yellow green			verde amarillo	Blanca Pepino	3
yellow			amarilla	Amarillo San Nicolás	4
dark yellow			amarillo oscuro	Amarillo Montesa	5
yellow orange			amarillo naranja	Morada Villa Hidalgo	6
orange			naranja	Picho Chulo	7
white pink			blanco rosado	Chapeada	8
pink			rosa	Melonillo Rosa	9
red			roja	Rubí Reyna	10
purple			púrpura	Cardona	11

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>53. Fruit: pulp firmness</b>			<b>Fruto: firmeza de pulpa</b>		
soft			suave	Memelo	3
medium			media	Cristalina	5
firm			firme	Octubreña	7
<b>54. Fruit: density of areoles</b>			<b>Fruto: densidad de areolas</b>		
few			pocas	Tapón de Mayo	3
medium			media	Cristalina	5
many			muchas	Rubí Reyna	7
<b>55. Fruit: glochides (*)</b>			<b>Fruto: glóquidas</b>		
few			pocas	Tapón de Mayo	3
medium			media	Cristalina	5
many			muchas	Sanjuanera, Rubí Reyna	7
<b>56. Fruit: glochides (*) color</b>			<b>Fruto: color de glóquidas</b>		
light yellow			amarillo claro	Tuna Mansa	1
brownish yellow			amarillo café	Camueso, Blanca San José	2
brown			marrón	Pico Chulo	3
orange			anaranjado	Amarilla San Nicolás	4
<b>57. Fruit: receptacle scar diameter</b>			<b>Fruto: diámetro de la cicatriz del receptáculo</b>		
small			pequeña	Rubí Reyna, Amarilla Montesa	3
medium			media	Cristalina, Pico Chulo	5
large			grande	Tapón de Mayo	7

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>58. Fruit: receptacle scar position</b> (+)			<b>Fruto: posición de la cicatriz del receptáculo</b>		
flattened			Aplanado	Alfajayucan	3
semi-depressed			Semihundido	Pico Chulo	5
depressed			Hundido	Rubí Reina	7
<b>59. Fruit: peduncle length</b> (+)			<b>Fruto: longitud del pedúnculo</b>		
short			corto	COPENA T-5	3
medium			medio	Amarilla Montesa	5
long			largo	Sanjuanera	7
<b>60. Fruit: seed number</b>			<b>Fruto: semillas por fruto</b>		
very few			muy pocas	Joconostle	1
few			pocas	Charola, Amarilla Montesa, Cardón, Cascarón	3
medium			media	Alfajayucan, COPENA T-5	5
many			Muchas	Burrona	7
very many			Bastantes	Tapón	9
<b>61. Fruit: seed weight (100 seeds)</b>			<b>Fruto: peso de semilla (100 semillas)</b>		
low			poco	Cardona, Cáscarona	3
medium			medio	Alfajayucan, Blanca de Castilla	5
high			alto	Burrona	7

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>62. Fruit: seed size</b> (* )			<b>Fruto: tamaño de semilla</b>		
small			pequeña	Cardona, Cascarona	3
medium			media	Reyna, Pico Chulo	5
large			grande	Blanca Sand José, Chapeada	7
<b>63. Fruit: abortive seed</b>			<b>Fruto: semillas abortivas</b>		
absent			ninguna	Cardoncilla, Roja Larga	1
low			pocas	Cardona, Burrona	3
medium			media	Pico Chulo, Chapeada	5
many			muchas	Charola	7
very many			bastantes	Blanca de Castilla	9
<b>64. Fruit: harvest time</b> (* )			<b>Fruta: tiempo de cosecha</b>		
early			temprana	Pico Chulo	3
medium			media	Amarilla Montesa	5
late			tardía	Burrona	7
very late			muy tardía	Charlola, Fafayuco	9
<b>65. Fruit: harvesting period</b>			<b>Fruto: período de cosecha</b>		
short			corto	Chapeada	3
medium			medio	Reyna, Pico Chulo	5
long			largo	Burrona	7
very long			muy largo	Joconostle	9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>66. Fruit: ripening homogeneity</b>			<b>Fruto: homogeneidad en la cosecha</b>		
absent			ausente	Joconostle	1
present			presente	Pico Chulo, Esmeralda	9
<b>68. Fruit: permanence in the plant</b>			<b>Fruto: permanencia en la planta</b>		
short			corta	COPENA F-1	3
medium			media		5
prolonged			prolongada		7
very prolonged			muy prolongada	Joconostle	9
<b>69. Fruit: acidity</b>			<b>Fruto: acidez</b>		
low			baja	Blanca Larga	3
medium			media	Fafayuco	5
high			alta	Blanca de Castilla	9
<b>70. Fruit: total soluble solids (°Brix)</b>			<b>Fruto: solidos totales solubles (°Brix)</b>		
low			bajo	Memelo	3
medium			medio	Cristalina, Pico Chulo	5
high			alto	Alfajayucan, Chapeada, COPENA T-13	7

VIII. Explanation on the Table of Characteristics

Ad. 1: Plant: growth habit



1

upright



2

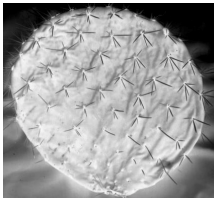
spreading



3

decumbent

Ad. 6: Cladode: shape



1

round



2

elliptic



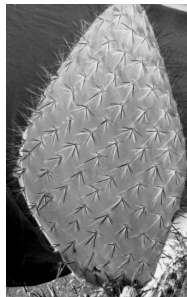
3

narrow obovate



4

obovate

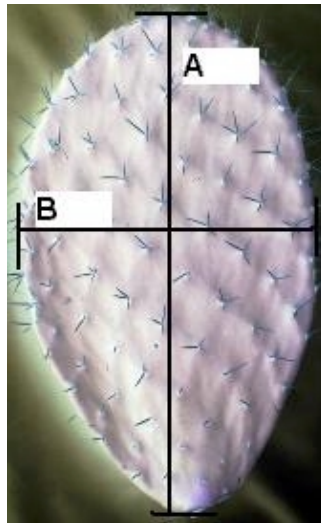


5

rhombic

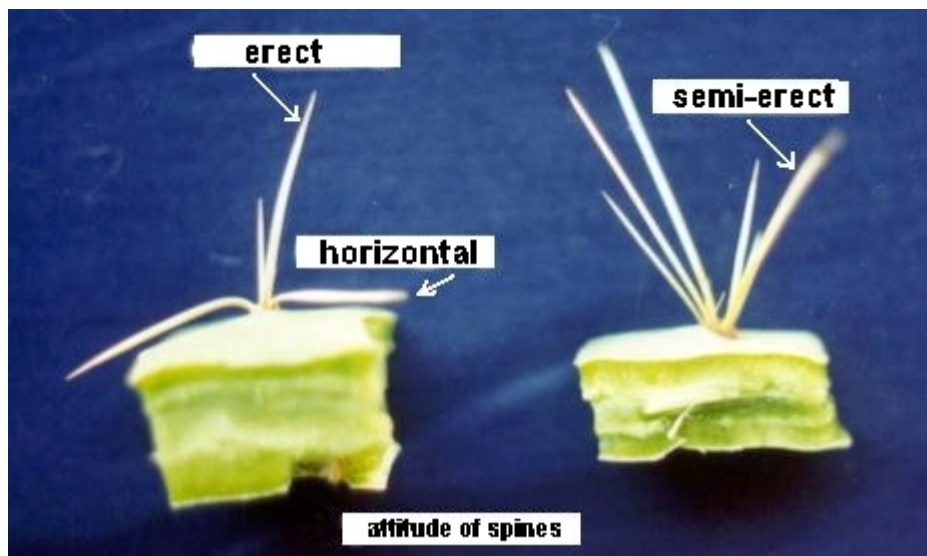
Ad. 10: Cladode: length

Ad. 11: Cladode: width



A= length  
B= width

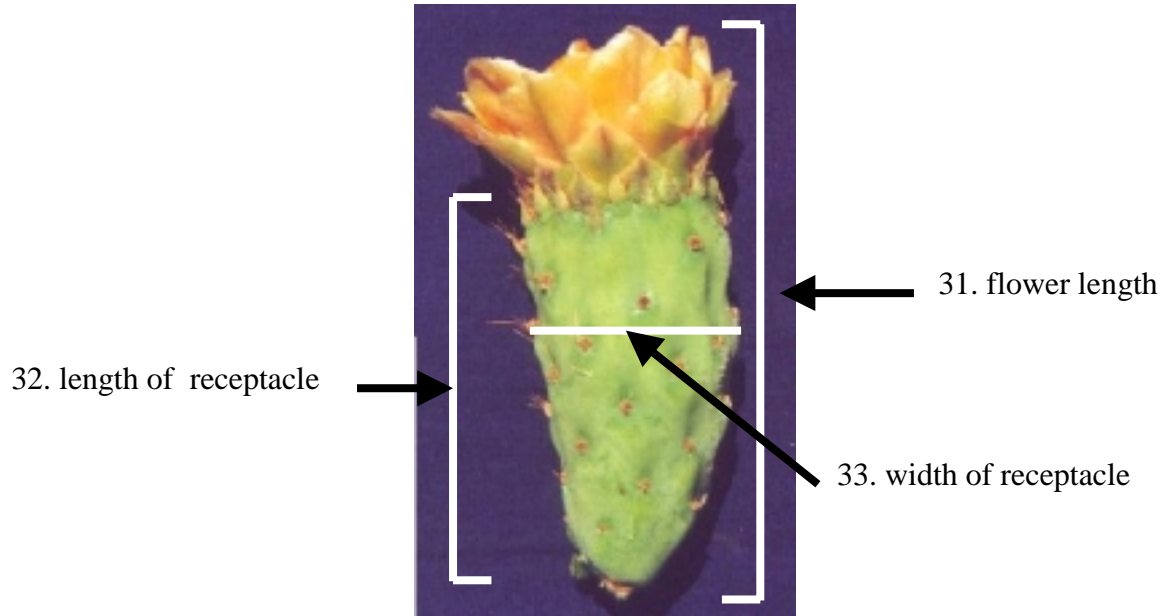
Ad. 18: Cladode: spine attitude



Ad. 31: Flower: length

Ad. 32: Flower: length of the receptacle

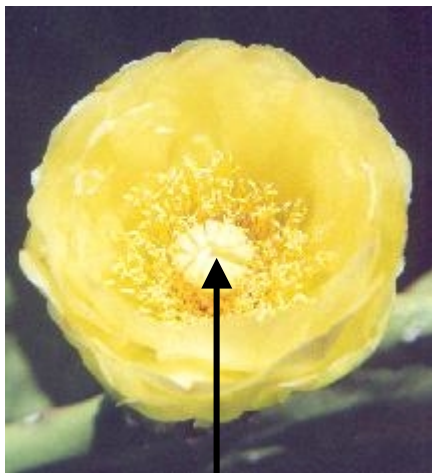
Ad. 33: Flower: width of the receptacle



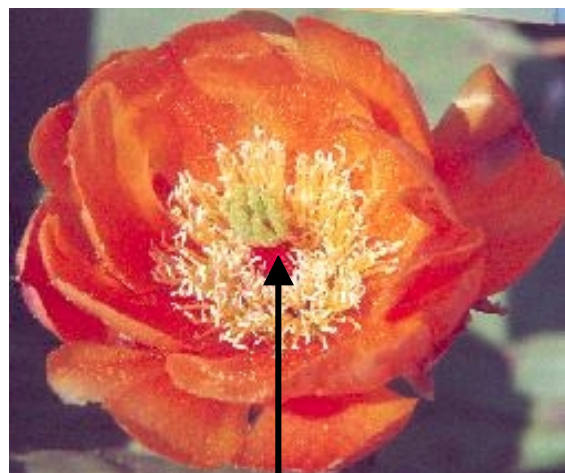
Ad. 36: Flower: stigma lobe number

Ad. 37: Flower: stigma lobe color

Ad. 38: Flower: style color



stigma lobe



style



Ad. 6: Fruit: shape



1  
compressed



2  
spheroid



3  
ellipsoid



4  
narrow ellipsoid



5  
oblong



6  
obovoid

Ad. 58: Fruit: receptacle scar position



3

flattened

5

semi-depressed



7

depressed

Ad. 59: Fruit: peduncle length



3  
short



5  
medium



7  
long

Synonyms o the example varieties:

Example Varieties	Synonym(s)
Alfajayucan	Reyna, Tuna Blanca, Taxa-kähä
Amarilla Montesa	Amarilla Huesona, Miquihuana
Esmeralda	COPENA XXA
Fafayuco	Fafayuca, Octubreña
Frida	Torreaja, COPENA XXXA
Milpa Alta	Tuna Morada
Pico Chulo	Naranjona, Apastillada, Copo de Oro
Tuna Mansa	Blanca

IX. Literature

Barrientos P., F. 1984. “Der anbau von feigenkakteen (*Opuntia* spp.) in Mexico”. Nutzung von kakteen un Ihre Problematik. Justus-Liebig Universität Giessen. Reihe I, Band. 11: 27-38.

Barrientos P., F., Muratalla L., A., Barrientos P., A. F. 1992. “New hybrids of *Opuntia*”. In: Mabry, T. J., Nguyen, H. T., Dixon, R. A. and M. S. Bonness. IC<sup>2</sup> Institute The University of Texas. Austin, Texas, USA. pp. 243-251.

Chessa, I., Niedu, G. 1997. “Descriptors for cactus pear (*Opuntia* spp)”. CACTUESNET, FAO – Università degli Studi di Reggio Calabria. Rome, Italy. 39 p.

Gallegos V., C., Blanco, F., Noriega A., M. G. 1994. “Establecimiento de una colección de nopal (*Opuntia* spp.) en el CRUCEN, Zacatecas, México”. Revista Geografía Agrícola 20:137-141.

Gallegos V., C., Valdez C., R. D., Blanco M., F. 1996. “Evaluación y seguimiento de la colección de nopal (*Opuntia* spp.) en el CRUCEN, Zacatecas”. In: R. Ortega P., E. Guízar N., E. Estrada M. y E. Cedillo P. Herbarios y Colecciones de Recursos Fitogenéticos de la Universidad Autónoma Chapingo: Antecedentes, Situación Actual y Perspectivas. SGI-DGA-Universidad Autónoma Chapingo. Chapingo, México. pp 69-80.

Mondragón J., C., Fernández M., M. R., Rodríguez A., J., Flores V., C. A. 1995. “Propuesta de descriptor para el registro de nopal”. In: E. Pimienta B., C. Neri L., A. Muñoz U. y F M. Huerta Martínez. Conocimiento y Aprovechamiento del Nopal. VI Congreso nacional y IV Congreso Internacional. Universidad de Guadalajara. Guadalajara, Jal. pp 127-131.

Moreno, N. P. 1984. “Glosario Botánico Ilustrado”. Instituto Nacional de Investigaciones sobre Recursos Bióticos – CECOSA. D.F., México. 300 p.

Muñoz, U. A. 1995. “Estudio anatómico, morfológico y citológico de seis variables de nopal tunero del Altiplano Potosino-Zacatecano”. Tesis profesional, Colegio de Postgraduados, Montecillo, Texcoco. México. pp 10-15, 30.

- Peralta M., V. M. 1983. "Caracterización fenológica y morfológica de formas de nopal (*Opuntia* spp.) de fruto (tuna) en el Altiplano Potosino-Zacatecano". Tesis Profesional. Universidad Autónoma de Aguascalientes. Aguascalientes, Ags. México 88 p.
- Pimienta Barrios, E. 1990. "El Nopal Tunero". Universidad de Guadalajara. Guadalajara, Jalisco. México. 246 p.
- Reyes A., J. A., Aguirre R., J. R. 1999. "Etnobotánica de *Opuntia* en la Altiplanicie Meridional de México". Instituto de Investigación de Zonas Desérticas, Universidad Autónoma de San Luis Potosí, S.L.P., México. 2 p.
- Reyes A., J. A. 1999. "Taller sobre morfología de *Opuntia*". VIII Congreso Nacional y VI Internacional sobre el Conocimiento y Aprovechamiento del Nopal. Universidad Autónoma de San Luis Potosí. San Luis Potosí, S. L. P., México. 8 p.
- Rodríguez S., E. 1992. "Caracterización de formas de nopal tunero en la Zacatecana, Guadalupe, Zac." Tesis Profesional. Facultad de Agronomía, Universidad Autónoma de Zacatecas. Zacatecas. Zac. 69 p.
- Rodríguez S., E., Nava C., A. 1999. "Nopal, Riqueza Agroecológica de México". COSNET, DGETA, Secretaría de Educación Pública. México, D. F. 160 p.
- Scheinvar, L. 1999. "Biosistemática de los xoconostles mexicanos y su potencial económico". In: J. R. Aguirre R. y J. A. Reyes A. (eds.). VIII Congreso Nacional y VI Internacional sobre conocimiento y aprovechamiento del nopal. Universidad Autónoma de San Luis Potosí. San Luis Potosí, S.L.P., México. pp. 255-274.

X. Technical Questionnaire

	Reference Number (not to be filled in by the applicant)
<p><b>TECHNICAL QUESTIONNAIRE</b> to be completed in connection with an application for plant breeders' rights</p>	
1. Species	<p><i>Opuntia</i> spp. L.  PRICKLY PEAR</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

(a) Seedling of unknown parentage [ ]

(b) Produced by controlled pollination [ ]  
(indicate parent varieties)

– Seed bearing parent (indicate parent)

.....

– Pollen parent (indicate parent)

.....

(c) Produced by open pollination of [ ]  
(indicate seed bearing parent plant)

.....

(d) Mutation or sport from (indicate original parent variety)

..... [ ]

(e) Discovery (indicate where and when)

..... [ ]

4.2 *In vitro* propagation

The plant material of the candidate variety has been obtained  
by *in vitro* propagation

yes [ ]

no [ ]

4.3 Virus status

- (a) The variety is free from all known viruses as follows: [ ]  
(indicate from which viruses)

.....

- (b) The plant material is virus tested [ ]  
(indicate against which viruses)

.....

- (c) The virus status is unknown [ ]

4.4 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	
<b>5.1 Cladode: areole color</b> (16)		
white	Milpa Alta	1[ ]
gray	Alfajayucan	2[ ]
yellow brown	Burrona	3[ ]
brown	Chaveña	4[ ]
black	Pico Chulo	5[ ]
<b>5.2 Fruit: peel color</b> (51)		
white	Blanca Platanillo	1[ ]
light green	Gavia	2[ ]
green	Burrona	3[ ]
yellow	Amarilla Plátano	4[ ]
dark yellow	Amarilla Montesa	5[ ]
orange	Naranjón, Pico Chulo	6[ ]
pink	Memelo	7[ ]
red	Rubí Reyna	8[ ]
dark red	Cardona	9[ ]
purple	Pachón, Morada	10[ ]
<b>5.3 Fruit: seed size</b> (62)		
small	Cardona, Cascarona	3[ ]
medium	Reyna, Pico Chulo	5[ ]
large	Blanca Sand José, Chapeada	7[ ]
<b>5.3 Fruit: harvest time</b> (64)		
early	Pico Chulo	3[ ]
medium	Amarilla Montesa	5[ ]
late	Burrona	7[ ]

6. Similar varieties and differences from these varieties

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 Resistance to pests and diseases

7.2 Special conditions for the examination of the variety

7.3 Other information

A representative color photo of the variety should be added to the Technical Questionnaire.

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]