



Republic of the Philippines
Department of Agriculture
BUREAU OF PLANT INDUSTRY
PLANT VARIETY PROTECTION OFFICE



GUIDELINES
FOR THE CONDUCT OF TESTS
FOR DISTINCTNESS, UNIFORMITY AND STABILITY

SWEET and HOT PEPPER

Capsicum annum L.

TABLE OF CONTENTS

	PAGE
I. Subject of these Guidelines.....	3
II. Material Required.....	3
III. Conduct of Tests.....	3
IV. Methods and Observations.....	4
V. Grouping of Varieties.....	4
VI. Characteristics and Symbols.....	5
VII. Table of Characteristics.....	6
VIII. Explanations on the Table of Characteristics.....	13
IX. Literature.....	18
X. Technical Questionnaire.....	19

I. Subject of these Guidelines

These Test Guidelines apply to all varieties of Capsicum annum L. (Sweet Pepper, Hot Pepper, Paprika)

II. Material Required

1. The Plant Variety Protection Office decide when, where and in what quantity and quality the seed required for testing the variety. Applicants submitting material from the Philippines must make sure that all customs formalities are complied with. The minimum quantity of plant material to be supplied by the applicant in one or several samples should be:

15 g.

The seed should at least meet the minimum 80% for germination, 10% moisture content and 90% purity for marketing certified seed in the country.

2. The plant material must not have undergone any treatment unless the Plant Variety Protection Office 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 dry and 2 wet seasons.

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 40 plants in the open or 20 plants in the greenhouse, 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. Authorities may designate a primary location, but organize an additional reserve trial in a separate location. In general, only the data from the primary location would be used, but in cases where that location failed, the reserve trial would be available to prevent the loss of one year's results, provided there was no significant variety-by-location interaction.

5. Additional tests for special purposes may be established.

IV. Methods and Observations

1. Unless otherwise indicated, 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 2% for open pollinated varieties and of 1% for hybrid varieties with an acceptance probability of 95% should be applied. In the case of a size of 40 plants in the open or 20 plants in the greenhouse, the maximum number of off-types allowed would be 1 for hybrid varieties in the open or in the greenhouse, whereas for open-pollinated varieties it would be 2 in the open and 1 in the greenhouse.

3. All observations on the leaf should be recorded on fully developed leaves on a level in flower beyond the first branching on secondary side shoots.

4. Unless otherwise indicated, all observations on the fruit should be made on well developed mature fruits of the second or third flowered node.

5. The variety description should state whether the records have been taken in the greenhouse or in the open.

6. 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.

2. It is recommended that the competent authorities use the following characteristics for grouping varieties:

- (i) Plant type: a) bush b) trellis
- (ii) Fruit type: 2) sweet pepper b) hot pepper
- (iii) Fruit : predominant shape of longitudinal section (characteristic 19)
- (iv) Fruit : capsaicin in placenta (characteristic 36)

VI. Characteristics and Symbols

1. To assess distinctness, uniformity and stability, the characteristics should be used.
2. Notes (1 to 9), for the purposes of electronic data processing, are given opposite the states of expressions of 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 states 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 for Sweet Pepper

Traits	Characteristics	Description/ Category	Reference (Example) Varieties	Note/ Remarks
1. (*)	Seedling: anthocyanin coloration of hypocotyls	absent		1
		present		9
2. (*)	Plant: Growth type	erect		3
		semi-erect	California wonder, Yolo wonder Bless All Season	5
		prostrate		7
3.	Plant: length of stem (from cotyledons to first flower/branching)	Short (35-40 cm)		3
		Medium (41-45 cm)	Bless All Season	5
		Long (46-50)		7
4. (*) (+)	Plant: shortened internode (in upper part)	absent	California wonder Bless All Season	1
		present		9
5. (+)	<u>Varieties with shortened internodes only:</u> Plant: number of internodes between the first flower and shortened internodes (test to be done on non-pruned plants)	none	California wonder	1
		one to three	Sinagtala	2
		more than three	Yellow wonder	3
6.	<u>Varieties without shortened internodes (on primary side shoots) only:</u> Plant: Length of internode	Short (8-10 cm)	Commandant	3
		Medium (11-12 cm)	Bless All Season	5
		Long (13-15)	Leila	7
7.	Plant: anthocyanin coloration at level of nodes	absent or very weak	California wonder, Yolo wonder, Sinagtala,	1
		weak		
		medium	Bless All Season	3

Traits	Characteristics	Description/ Category	Reference (Example) Varieties	Note/ Remarks
		strong		5
		very strong	Leila	7
				9
8.	Plant: Time to 50% flowering node from sowing) 38-40 days	Early (30-35 days)	Bless All Season	3
		Medium (36-40 days)		5
		Late (41-45 days)		7
9.	Plant: Time to 50% ripening (color change of fruits from sowing) 100-105 days	Narrow (85-90)	Bless All Season	3
		Medium (91-95 days)		5
		Broad (96-100 days)		7
10. (*)	Leaf: length of blade	Short (4.0-6.0 cm)	Bless All Season	3
		Medium (6.1-8.0 cm)		5
		Long (8.1-10 cm)		7
11. (*)	Leaf: width	Narrow (5.0-6.0 cm)	Bless All Season	3
		Medium (6.1-7.0 cm)		5
		Broad (7.1-8.0 cm)		7
12.	Leaf: green color	Absent	Bless All Season	1
		Present		9
13.	Intensity of green color	light	Bless All Season	3
		medium		5
		dark		7
14.	Leaf: blistering	Absent	Bless All Season	1
		Present		9
15. (*) (+)	Flower: orientation of peduncle	Erect	Bless All Season	1
		Non-erect		2

Traits	Characteristics	Description/ Category	Reference (Example) Varieties	Note/ Remarks
16 (*)	Fruit: color before maturity	Greenish white		1
		Yellowish	Trinity	2
		Green	California wonder, yolo wonder Bless All Season	3
		purple	Leila	4
17	Fruit: intensity of color <u>before</u> maturity	Light		3
		Medium	California wonder, yolo wonder	5
		Dark	Leila	7
18	Fruit: orientation	Erect		1
		Horizontal		2
		drooping	California wonder, yolo wonder, sinagtala Bless All Season	3
19 (*)	Fruit: length (polar)	Short (8.0-9.0 cm)	Bless All Season	3
		Medium (9.1-10.0 cm)		5
		Long (10.1-11.0 cm)		7
20	Fruit: diameter (equatorial)	Narrow (6.0-7.0 cm)	Bless All Season	3
		medium (7.1-8.0 cm)		5
		wide (8.1-9.0 cm)		7
21.	Fruit: ratio length/diameter	Small (9.0/7.0=1.29)		3
		Medium (10.0/8.0=1.25)		5
		Large (11.0/9.0=1.22)		7
22. (*) (+)	Fruit : predominant shape of longitudinal section	Flattened	Bless All Season	1
		Round		2

Traits	Characteristics	Description/ Category	Reference (Example) Varieties	Note/ Remarks
		Heart shaped		3
		Square	Yolo wonder, California wonder	4
		Rectangular		5
		Trapezoid		6
		Triangular	Sinagtala, Majesty, Trinity	7
		Narrow triangular		8
		horn-shaped		9
23.	Fruit: predominant shape of cross section (at level of placenta)	Elliptic	Bless All Season	1
		Angular		2
		Circular		3
24.	Fruit: sination of pericarp at basal part	Weak		3
		Medium		5
		Strong		7
25.	Fruit: texture of surface	Smooth	Sinagtala	1
		Slightly wrinkled	California wonder	2
		Strongly wrinkled		3
26. (*)	Fruit: color <u>at</u> maturity	Yellow	Trinity	1
		Orange		2
		Red	Sinagtala, all season yolo wonder Bless All Season	3
		Brown		4
		purple	Leila	5

Traits	Characteristics	Description/ Category	Reference (Example) Varieties	Note/ Remarks
27. (*)	Fruit: intensity of color <u>a</u> t maturity	Light		3
		medium	California wonder, yolo wonder Bless All Season	5
		dark	Leila	7
28.	Fruit: glossiness	Weak		1
		Medium	California wonder, yolo wonder Bless All Season	5
		Strong	sinagtala	9
29. (*)	Fruit: peduncle cavity	Absent	Sinagtala, plastic,	1
		Present	California wonder, yolo wonder	9
30.	Fruit: depth of peduncle cavity	Shallow	Bless	1
		Medium	California wonder, yolo wonder	3
		Deep	All Season	7
31.	Fruit: shape of apex (tip)	Acute	Sinagtala Bless	1
		Rounded	California wonder, yolo wonder All Season	2
		depressed		3
32.	Fruit: depth of interloculary grooves	Shallow	Bless All Season	3
		Medium		5
		Deep		7
33. (*)	Fruit: predominant number of locules	Only two	Bless All Season	1
		Two to three		2
		Three to four		3
		Four or more		4

Traits	Characteristics	Description/ Category	Reference (Example) Varieties	Note/ Remarks
34. (*)	Fruit: thickness of flesh (mm)	Thin (2.0-3.0 mm)	All season, sinagtala	3
		Medium (3.1-4.0mm)		5
		Thick (4.1-5.0 mm)	California wonder, yolo wonder, Leila Bless All Season	7
35.	Placenta: size	Small (1.5-2.0 cm)	All season, sinagtala	1
		Medium (2.1-2.5cm)	Bless All Season	5
		Large (2.6-3.0 cm)	California wonder, Yolo wonder	9
36.	Fruit: peduncle length (mm)	Short (15-20)		3
		Medium (21-25)		5
		Long (26-30)		7
37.	Fruit: peduncle diameter (mm)	Narrow (4.0-6.0)		3
		Medium (6.1-8.0)		5
		Wide (8.1-10.0)		7
38 (+)	Fruit: calyx aspect	Non enveloping	Bless All Season	1
		enveloping		2
39. (*)	Fruit: capsaicin in placenta	Absent	California wonder, Yolo wonder, Leila Bless All Season	1
		Slightly hot	Sinagtala	3
		Medium hot		5
		Hot		7
		Very hot		9
40.	Shelf life	Short (5-7 days)		3
		Medium (8-10 days)	Bless All Season	5

Traits	Characteristics	Description/ Category	Reference (Example) Varieties	Note/ Remarks
		Long (11-15 days)		7
41.	Reaction to Diseases	absent		1
41.1 (*)	Late blight	present		9
41.2	Bacterial wilt	absent	Bless (MR) All Season (MR)	1
		present		9
41.3	Leaf curl virus	absent	Bless (I) All Season (II)	1
		present		9
42	Reaction to insect pests			
42.1 (*)	Aphids	absent		1
		present		9
42.2	Thrips	absent		1
		present		9
42.3	Fruit fly	absent	Bless (I) All Season (II)	1
		present		9
42.4 (+)	Mites	absent		1
		present		9
42.5	Leaf miner	absent		1
		present		9

VIII. Explanations on the Table of Characteristics

Ad 4 + 5

Plant: shortened internodes (4), number of internodes between the first flower and shortened internodes (5)

The shoot system of pepper consists of main stem, which are branched off from the main axis and side shoots. Two growth types of the main stems can be distinguished:

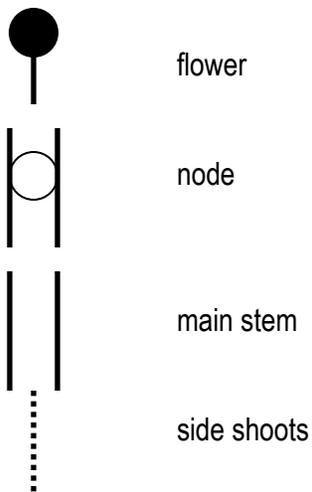
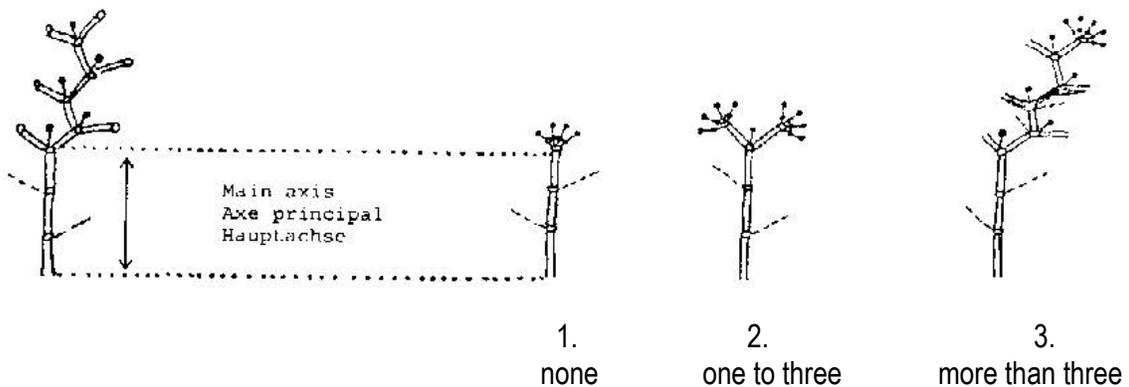
Growth type A: the main stems grow indeterminately; one or two flowers develop per node and shortened internodes never develop.

Growth type B: After the first branching of the main axis shorter internodes appear and the growth of the main stem ends in a bunch of flowers (it appears as if there were more than two flowers per node).

Side shoots develop from the nodes on the main axis and on the main stems.

Growth type A

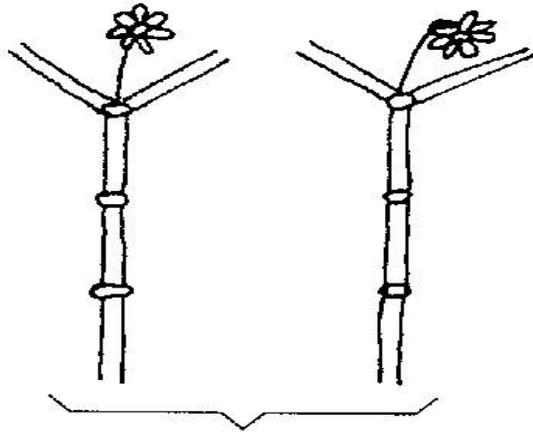
Growth type B



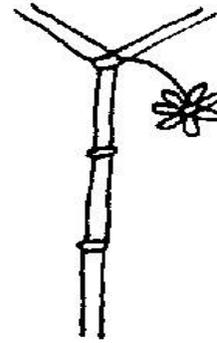
number of internodes between the first flower and shortened internodes

Ad 12

Flower: attitude of peduncle



1
erect



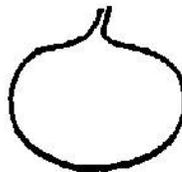
2
non-erect

Ad 19

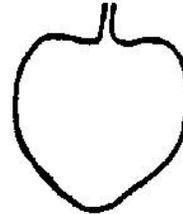
Fruit: predominant shape of longitude section



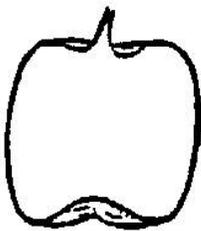
1
flattened



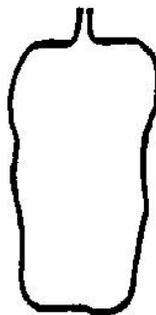
2
round



3
heartshaped



4
square



5
rectangular



6
trapezoid



7
triangular



8
narrow triangular



9
hornshaped

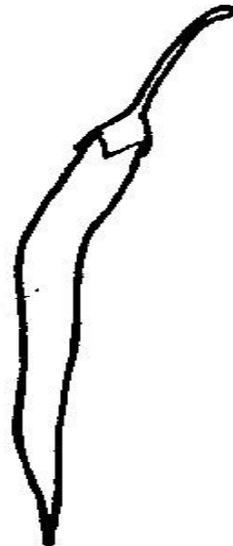


Ad 35

Calyx: aspect



1
Non enveloping



2
enveloping

Ad 39.1 – 39.3

Resistance to Tobamovirus

Method

Maintenance of pathotypes

Type of medium: On plants or dehydrated leaves (in deep-freezer or method BOS).
Special conditions: Regeneration of the virus on plant material before inoculum preparation.

Execution of test

Growth stage of plants: When cotyledons are fully developed or in “first leaf” stage.
Temperature: 20-25°C
Method of inoculation: Rubbing of cotyledons with a virus suspension.

Duration of test

- Sowing to inoculation: 10 to 15 days
- Inoculation to reading: 10 days
Number of plants tested: 15 to 30 plants
Remarks: Avoid the test performance at high temperatures or using too far developed plants (risk of necrosis).

Ad 41

Resistance to Phytophthora capsici

Method

Maintenance of inoculum

Type of medium: Phytophthora capsici isolate s 101 cultivated on agar (1%) V8 in Petri dish.

Preparation of inoculum

The inoculum is prepared from 4 mycelial plugs of 4 mm diameter cultured in Petri dishes.

Conduct of test

Growth stage of plants: When cotyledons are fully developed
Temperature: 22°C
Light: 12h/day
Growing method: In climatic chamber in a mixture of peat and sand (1/1 by vo.).
Method of inoculation: The young plants should be pulled out cautiously and the roots washed in water. Then the plants should be regrouped in samples of 10 plants and put into liquid growth medium (Knop diluted twice) or onto a nutrient solution. After one week of

culture in liquid medium the plants should be inoculated. The inoculation is realized by introduction of 4 mycelial plugs into the liquid growth medium. The roots are soaking in this environment and the inoculation takes place in a natural way by the free zoospores which infect the roots. The mycelial plugs are kept in this environment until reading.

Duration of test

From sowing to inoculation: 21 days

From inoculation to first reading: 7 days

Lay-out of test: 40 plants, in 4 replicates of 10 plants

Standard varieties: After one week the plants should be observed one by one and a note from 1 to 5 is attributed to each plants depending on the degree of necrosis of the root system assessed. The level of resistance of a variety is expressed by a figure calculated as the average of 40 plants:

After inoculation by isolate s 101, for example:

Yolo Woder = 5

Phyo = 2.5

Picador, PM 217 = 0.5

Varieties which have received a figure 3 or higher than 3 should be regarded as non-resistant.

IX. Literature

- SOMOS, A., 1984: "The Pabrika", Akademiai Kiadó, Budapest, HU.
- BOSLAND, Paul W., 1992: "Chiles: a diverse crop", Hort. Technology 2 (1), pp. 6-10.
- GUERRERO-MORENO, A., and LABORDE, J.A., 1980: "Current status of pepper breeding for resistance to *Phytophthora capsici* in Mexico", Eucarpia Capsicum Working Group, 4th Meeting, October 14-16, 1980, Wageningen.
- RAST, A.Th.B., 1988: "Pepper tobamoviruses and pathotype used in resistance breeding", Capsicum Newsletter 7, pp. 20-23.
- SMITH, P.G., KIMBLER, K.A., GROGAN, R.G., and MILLET, A.H., 1967: "Inheritance of Resistance in Peppers to *Phytophthora* Root Rot", Phytopathology 57, 377-379.

X. Technical Questionnaire

Reference Number
(not to be filled in by the applicant)

TECHNICAL QUESTIONNAIRE

To be completed in connection with an application for plant breeders' rights

1. Species *Capsicum annum* L

SWEET PEPPER, HOT PEPPER, PAPRIKA

2. Applicant (Name and address)

3. Proposed denomination or breeder's reference

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

4.1 Method of maintenance and reproduction

- (i) Hybrid []
- (ii) open-pollinated variety []

4.2 Other information

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

	Characteristics	Example Varieties	Note
5.1 (4)	Plant: shortened internode (in upper part)	absent	1 []
		present	9 []
5.2 (12)	Flower: attitude of peduncle	Erect	1 []
		Non-erect	2 []

	Characteristics	Example Varieties	Note
5.4 (19)	Fruit: predominant shape of longitudinal section	Flattened	1 []
		Round	2 []
		Heartshaped	3 []
		Square	4 []
		Rectangular	5 []
		Trapezoid	6 []
		Triangular	7 []
		Narrow triangular	8 []
		Hornshaped	9 []
5.5 (23)	Fruit: color <u>at</u> maturity	Yellow	1 []
		Orange	2 []
		Red	3 []
		Brown	4 []
5.6 (30)	Fruit: predominant number of locules	Only two	1 []
		Two and three	2 []
		Three and four	3 []
		Four and more	4 []
5.7 (36)	Fruit: capsaicin in placenta	Absent	1 []
		Present	9 []

6. Similar varieties and different from these varieties

Denomination of similar variety	Characteristic in which the similar variety is different °)	State of expression of similar variety	State of expression of candidate variety
---------------------------------	---	--	--

°) In the case of identical states of expression 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

	Absent	Present	Not tested
i. Tobamovirus			
Pathotype P ₀ (characteristic 39.1)	[]	[]	[]
Pathotype P ₁ (characteristic 39.2)	[]	[]	[]
Pathotype P ₁₋₂ (characteristic 39.3)	[]	[]	[]
Pathotype P ₁₋₂₋₃ (characteristic 39.4)	[]	[]	[]
ii. Potato Virus Y (PVY)			
Pathotype 0 (characteristic 40.1)	[]	[]	[]
Pathotype 1 (characteristic 40.2)	[]	[]	[]
Pathotype 1-2 (characteristic 40.3)	[]	[]	[]
iii. <u>Phytophthora capsici</u> (characteristic 41)	[]	[]	[]
iv. Other resistances (specify)	[]	[]	[]

7.2 Special conditions for the examination of the variety

- (i) Type of culture
 - in glasshouse []
 - in the open []
 - in the open and in glasshouse []
- (ii) Main use
 - fresh market []
 - canning []
 - powder []
- (iii) Other conditions

7.2 Other information

(end of document)