



PROTOCOL FOR TESTS ON DISTINCTNESS, UNIFORMITY AND STABILITY

Gossypium L.

COTTON

UPOV Code: GOSSY

Adopted on 11/12/2020

Entry into force on 01/01/2021

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CPVO-TP/088/2

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1. SUBJECT OF THE PROTOCOL AND REPORTING

1.1 Scope of the technical protocol

This Technical Protocol applies to all varieties of *Gossypium* L.

The protocol describes the technical procedures to be followed in order to meet the requirements of Council Regulation 2100/94 on Community Plant Variety Rights. The technical procedures have been agreed by the Administrative Council and are based on documents agreed by the International Union for the Protection of New Varieties of Plants (UPOV), such as the General Introduction to DUS(UPOV Document TG/1/3 http://www.upov.int/export/sites/upov/resource/en/tg_1_3.pdf), its associated TGP documents (<http://www.upov.int/tgp/en/>) and the relevant UPOV Test Guideline TG/088/7 dated 30/10/2018 <http://www.upov.int/edocs/tgdocs/en/tg088.pdf> for the conduct of tests for Distinctness, Uniformity and Stability.

1.2 Entry into Force

The present protocol enters into force on **01/01/2021**. Any ongoing DUS examination of candidate varieties started before the aforesaid date will not be affected by the approval of the Technical Protocol. Technical examinations of candidate varieties are carried out according to the TP in force when the DUS test starts. The starting date of a DUS examination is considered to be the due date for submitting of plant material for the first test period.

In cases where the Office requests to take-over a DUS report for which the technical examination has either been finalized or which is in the process to be carried out at the moment of this request, such report can only be accepted if the technical examination has been carried out according to the CPVO TP which was in force at the moment when the technical examination started.

1.3 Reporting between Examination Office and CPVO and Liaison with Applicant

1.3.1 Reporting between Examination Office and CPVO

The Examination Office shall deliver to the CPVO a preliminary report ("the preliminary report") no later than two weeks after the date of the request for technical examination by the CPVO.

The Examination Office shall also deliver to the CPVO a report relating to each growing period ("the interim report") and, when the Examination Office considers the results of the technical examination to be adequate to evaluate the variety or the CPVO so requests, a report relating to the examination ("the final report").

The final report shall state the opinion of the Examination Office on the distinctness, uniformity and stability of the variety. Where it considers those criteria to be satisfied, or where the CPVO so requests, a description of the variety shall be added to the report. If a report is negative the Examination Office shall set out the detailed reasons for its findings.

The interim and the final reports shall be delivered to the CPVO as soon as possible and no later than on the deadlines as laid down in the designation agreement.

1.3.2 Informing on problems in the DUS test

If problems arise during the course of the test the CPVO should be informed immediately so that the information can be passed on to the applicant. Subject to prior permanent agreement, the applicant may be directly informed at the same time as the CPVO particularly if a visit to the trial is advisable.

1.3.3 Sample keeping in case of problems

If the technical examination has resulted in a negative report, the CPVO shall inform the Examination Office as soon as possible in case that a representative sample of any relevant testing material shall be kept.

2. MATERIAL REQUIRED

2.1 Plant material requirements

Information with respect to the agreed closing dates and submission requirements of plant material for the technical examination of varieties can be found on <http://cpvo.europa.eu/applications-and-examinations/technical-examinations/submission-of-plant-material-s2-publication> in the special issue S2 of the Official Gazette of the Office. General requirements on submission of samples are also to be found following the same link.

2.2 Informing the applicant of plant material requirements

The CPVO informs the applicant that

- he is responsible for ensuring compliance with any customs and plant health requirements.
- the plant material supplied should be visibly healthy, not lacking in vigour, nor affected by any important pest or disease.
- the plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

2.3 Informing about problems on the submission of material

The Examination Office shall report to the CPVO immediately in cases where the test material of the candidate variety has not arrived in time or in cases where the material submitted does not fulfil the conditions laid down in the request for material issued by the CPVO.

In cases where the examination office encounters difficulties to obtain plant material of reference varieties the CPVO should be informed.

3. METHOD OF EXAMINATION

3.1 Number of growing cycles

The minimum duration of tests should normally be two independent growing cycles.

3.2 Testing Place

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 "Examining Distinctness" http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf.

3.3 Conditions for Conducting the Examination

The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

The optimum stage of development for the assessment of each characteristic is indicated by a number in the third column of the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.3

3.4 Test design

- 3.4.1 Each test should be designed to result in a total of at least 500 plants, which should be divided between at least 2 replicates.
- 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 Special test for additional characteristics

In accordance with Article 23 of Implementing Rules N° 874/2009 an applicant may claim either in the Technical Questionnaire or during the test that a candidate has a characteristic which would be helpful in establishing distinctness. If such a claim is made and is supported by reliable technical data, a special test may be undertaken providing that a technically acceptable test procedure can be devised.

Special tests will be undertaken, with the agreement of the President of CPVO, where distinctness is unlikely to be shown using the characters listed in the protocol.

3.6 Constitution and maintenance of a variety collection

The process for the constitution and the maintenance of a variety collection can be summarized as follows:

Step 1: Making an inventory of the varieties of common knowledge

Step 2: Establishing a collection ("variety collection") of varieties of common knowledge which are relevant for the examination of distinctness of candidate varieties

Step 3: Selecting the varieties from the variety collection which need to be included in the growing trial or other tests for the examination of distinctness of a particular candidate variety.

3.6.1 Forms of variety collection

The variety collection shall comprise variety descriptions and living plant material, thus a living reference collection. The variety description shall be produced by the EO unless special cooperation exists between EOs and the CPVO. The descriptive information produced by the EO shall be held and maintained in a form of a database.

3.6.2 Range of the variety collection

The living variety collection shall cover at least those varieties that are suitable to climatic conditions of a respective EO.

3.6.3 Making an inventory of varieties of common knowledge for inclusion in the variety collection

The inventory shall take into account the list of protected varieties and the official, or other, registers of varieties, in particular:

The inventory shall include varieties protected under National PBR (UPOV contracting parties) and Community PBR, varieties registered in the Common Catalogue, the OECD list, the Conservation variety list and varieties in trade or in commercial registers for those species not covered by a National or the Common Catalogue.

3.6.4 Maintenance and renewal/update of a living variety collection

The EO shall maintain seeds in conditions which will ensure germination and viability, periodical checks, and renewal as required. For the renewal of existing living material the identity of replacement living plant material shall be verified by conducting side-by-side plot comparisons between the material in the collection and the new material.

4. ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY

The prescribed procedure is to assess distinctness, uniformity and stability in a growing trial.

4.1 Distinctness

4.1.1 General recommendations

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS(link in chapter 1 of this document) and TGP 9 'Examining Distinctness' http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in this Technical Protocol.

4.1.2 Consistent differences

The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

4.1.3 Clear differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Technical Protocols are familiar with the recommendations contained in the UPOV-General Introduction to DUS prior to making decisions regarding distinctness.

Decision standards

If distinctness is assessed using the 2 x 1% criterion, the varieties need to be significantly different in the same direction at the 1% level in at least two out of three years in one or more measured characteristics. The tests in each year are based on Student's two-tailed t-test of the differences between variety means with standard errors estimated using the residual mean square from the analysis of the variety x replicate plot means.

If the significance level or statistical methods proposed are not appropriate the method used should be clearly described.

4.1.4 Number of plants/parts of plants to be examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 20 plants or parts taken from each of 20 plants and any other observations made on all plants in the test, disregarding any off-type plants.

4.1.5 Method of observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the third column of the Table of Characteristics (see document TGP/9 "Examining Distinctness", Section 4 "Observation of characteristics"):

MG:	single measurement of a group of plants or parts of plants
MS:	measurement of a number of individual plants or parts of plants
VG:	visual assessment by a single observation of a group of plants or parts of plants
VS:	visual assessment by observation of individual plants or parts of plants

Type of observation: visual (V) or measurement (M)

"Visual" observation (V) is an observation made on the basis of the expert's judgment. For the purposes of this document, "visual" observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. colour charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, "G" provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness."

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2.

4.2 **Uniformity**

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction (link in chapter 1 of this document) and TGP 10 'Examining Uniformity' (http://www.upov.int/edocs/tgpdocs/en/tgp_10.pdf) prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in this Technical Protocol:

For the assessment of uniformity of self-pollinated varieties and hybrid 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 500 plants, 9 off-types are allowed.

4.3 **Stability**

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction (link in chapter 1 of this document) and TGP 11 'Examining Stability' (http://www.upov.int/edocs/tgpdocs/en/tgp_11.pdf)

In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.

Where appropriate, or in cases of doubt, stability may be further examined by testing a new seed stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. **GROUPING OF VARIETIES AND ORGANIZATION OF THE GROWING TRIAL**

5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.

5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics.

- a) Plant: type of flowering (characteristic 1)
- b) Flower: colour of petal (characteristic 2)
- c) Leaf: shape (characteristic 9)
- d) Leaf: presence of nectaries (characteristic 12)
- e) Boll: shape in longitudinal section (characteristic 18)
- f) Boll: time of opening (characteristic 24)

5.4 If other characteristics than those from the TP are used for the selection of varieties to be included into the growing trial, the EO shall inform the CPVO and seek the prior consent of the CPVO before using these characteristics.

6. INTRODUCTION TO THE TABLE OF CHARACTERISTICS

6.1 Characteristics to be used

The characteristics to be used in DUS tests and preparation of descriptions shall be those referred to in the table of characteristics. All the characteristics shall be used, providing that observation of a characteristic is not rendered impossible by the expression of any other characteristic, or the expression of a characteristic is prevented by the environmental conditions under which the test is conducted or by specific legislation on plant health. In the latter case, the CPVO should be informed.

The Administrative Council empowers the President, in accordance with Article 23 of Commission Regulation N°874/2009, to insert additional characteristics and their expressions in respect of a variety.

States of expression and corresponding notes

In the case of qualitative and pseudo-qualitative characteristics, all relevant states of expression are presented in the characteristic. However, in the case of quantitative characteristics with 5 or more states, an abbreviated scale may be used to minimize the size of the Table of Characteristics. For example, in the case of a quantitative characteristic with 9 states, the presentation of states of expression in the Test Guidelines may be abbreviated as follows:

State	Note
small	3
medium	5
large	7

However, it should be noted that all of the following 9 states of expression exist to describe varieties and should be used as appropriate:

State	Note
very small	1
very small to small	2
small	3
small to medium	4
medium	5
medium to large	6
large	7
large to very large	8
very large	9

6.2 Example Varieties

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic.

6.3 Legend

For the CPVO N° column:

G	Grouping characteristic	– see Chapter 5
QL	Qualitative characteristic	
QN	Quantitative characteristic	
PQ	Pseudo-qualitative characteristic	
(+)	See Explanations on the Table of Characteristics in Chapter 8.2	

For the UPOV N° column:

The numbering of the characteristics is provided as a reference to the ad hoc UPOV guideline.

(*)	UPOV Asterisked characteristic – Characteristics that are important for the international harmonization of variety descriptions.
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For the column "stage, method":

MG, MS, VG, VS	Method of observation	– see Chapter 4.1.5
65 – 99	Growth stage key	- Chapter 8.3
(a)-(d)	See Explanations on the Table of Characteristics in Chapter 8.1	

7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
1. (+)	1.	VG	Plant: type of flowering		
PQ	(*)	61-65	clustered	Alepo, Armada	1
			semi-clustered	Aphrica, DP411, Elina	2
G			non-clustered	CS37, DP332, DP401	3
2.	2.	VG	Flower: colour of petal		
QL	(*)	65	whitish	DP377, Celia	1
G		(a)	yellow	Armada, Intercott 670	2
3.	3.	VG	Flower: intensity of yellow colour		
QN		65	light	Solera	3
		(a)	medium	Armada, Intercott 670	5
			dark		7
4.	4.	VG	Petal: spot		
QN		65	absent or very weak	ST405, Tosca	1
		(a)	weak		3
			medium	Intercott 701	5
			strong	Armada, Sevilla	7
			very strong	E1	9
5.	5.	VG	Flower: colour of pollen		
PQ	(*)	65	whitish	Solera, DP414, Flora	1
		(a)	medium yellow	Armada, Alepo	2
			dark yellow	Kendra, Phylong 1	3
6 (+)	6.	VG	Flower: position of stigma relative to anthers		
QN		65	clearly below	Carlota, CS37	1
		(a)	same level	DP377, DP411	2
			clearly above	Lanovia, ST478	3

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
7.	7.	VG	Plant: density of foliage		
QN		65-69	sparse	Hersi	3
			medium	E1, Solera	5
			dense	Zeta 2	7
8.	8.	VG	Leaf: intensity of green colour		
QN		65-69	light	Corona, PRG9048, Campo	1
		(b)	medium	Aphrica,	2
			dark	Armada, Lagiralda, Zeta 2	3
9.	9.	VG	Leaf: shape		
(+)	(*)	65-69	palmate	Alepo, Solera, Andromeda	1
PQ		(b)	palmate to digitate	Intercott 195, Intercott 211	2
			digitate	Lacta, Roka	3
G			lanceolate		4
10.	10.	VG	Leaf: size		
(+)		65-69	small	PRG9706	3
QN		(b)	medium	DP377, Intercot670, Flora	5
			large	Alepo, Lagiralda, Zeta 2	7
11.	11.	VG	Leaf: pubescence		
(+)	(*)	65-69	absent or very weak	Claudia	1
QN		(b)	weak	Celia, DP466, Lydia	3
			medium	Intercott 670, Flora	5
			strong	ST405, Christina	7
			very strong	Lanovia	9
12.	12.	VG	Leaf: presence of nectaries		
QL	(*)	65-69	absent	Guazuncho 3 INTA	1
G		(b)	present	DP396, ST488	9

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
13.	13.	VG	Stem: pubescence on upper part		
QN		65-79	absent or very weak	Alepo	1
		(b)	weak	E1, Lydia, Claudia	3
			medium	DP332, Fokion	5
			strong	Europa, ST478, Tzortzina	7
			very strong	Christina	9
14.	14.	VG	Stem: colour		
(+)		65-79	green	ST405, ST318	1
PQ		(b)	reddish green	Alepo, Solera	2
15.	15.	VG	Bract: dentation		
(+)		71-75	fine	E1, Intercott 701, Armada	3
QN		(c)	medium	Elsa, Intercott 670	5
			coarse	Roka, Prime 1848	7
16.	16.	VG	Bract: size		
QN		71-75	very small		1
		(c)	small	DP332, ST478, Carla	3
			medium	DP414, Solera, Campo	5
			large	Alepo, E1, Fantom	7
			very large	Armada	9
17.	17.	MS/VG	Boll: size		
QN		71-75	very small		1
		(c)	small	Armada, Lanovia	3
			medium	E1, Solera, Celia	5
			large	Zeta 2	7
			very large	Intercott 701	9

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
18.	18.	VG	Boll: shape in longitudinal section		
(+)	(*)	71-75	circular	Prime 1848, ST439	1
PQ		(c)	elliptical	DP399, ST478	2
			ovate	Alepo, Solera, Elsa, Sandra	3
G			conical	Intercott 195, Intercott 211, Intercott 701	4
19.	19.	VG	Boll: pitting of surface		
QN		71-75	fine	Viky	3
		(c)	medium	DP414, Solera, Celia	5
			coarse	E1, Intercott 211	7
20.	20.	MS/VG	Boll: length of peduncle		
	(*)	71-75	very short		1
		(c)	short	DP377, Solera	3
QN			medium	E1, Intercott 701, Prime 1004	5
			long	Beky, Intercott 211	7
			very long	Armada	9
21.	21.	VG	Boll: prominence of tip		
(+)		71-75	weak	Carla	3
QN		(c)	medium	DP377, DP414, Lidra, ST 318	5
			strong	E1, Intercott 670, Sandra	7
22.	22.	VG	Plant: shape		
(+)	(*)	75-79	cylindrical	Alepo, Armada	1
PQ			conical	Fokion, Intercott 670, Carla, Flora	2
			globose	E1, Solera, DP419	3

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
23.	23.	MG/MS	Plant: height		
QN	(*)	79-89	very short		1
			short	Armada, DP419	3
			medium	Alepo, Solera, Fantom	5
			tall	Intercott 670, Intercott 701, Tzortzina	7
			very tall		9
24.	24.	MG	Boll: time of opening		
(+)	(*)	80-81	very early	Pirin	1
QN			early	ST318, ST402, Carla	3
			medium	Alepo, Solera, Elsa, PRG9706	5
			late	Abaco, Prime 1848, Zoi	7
G			very late	Etna, Fiona	9
25.	25.	VG	Boll: degree of opening		
QN		85-89	weak		3
		(c)	medium	Lagiralda, Solera, Prime 1004, Speed	5
			strong	ST318, ST402, Esperia, Tosca	7
26.	26.	VG	Seed: density of fuzz		
QN		99	absent or very sparse		1
			sparse	Lanovia, Sevilla, Prime 1848	3
			medium	DP377, DP414, Sandra	5
			dense	Acala sj-2, Famosa	7
			very dense	Zoi	9
27.	27.	VG	Seed: colour of fuzz		
PQ		99	white	Armada, Lagiralda	1
			grey	ST318, ST402	2
			greenish	DP414, Solera	3
			brownish	Intercott 670, Lanovia	4

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note		
28.	28.	MG	Seed: 100 seed weight				
		(+)	99	low	DP377, Solera	3	
		QN		medium	E1, Elsa	5	
		G		high	Armada, Intercott 701	7	
29.	29.	MG	Boll: content of lint				
		(+)	99	very low	Europa	1	
		QN		low	Etna, Sevilla	3	
				medium	Helena, Intercott 701	5	
				high	ST318, ST405, Claudia	7	
				very high	Solera, DP414, Tosca	9	
30.	30.	MG	Fiber: length				
		QN	(*)	99	very short	1	
				(d)	short	3	
					medium	Solera, DP414, Leon	5
					long	Elsa, DP332, Carla	7
					very long	E1, Intercott 670, Armada	9
31.	31.	MG	Fiber: strength				
		QN		99	very weak	1	
				(d)	weak	ST373, Armonia	3
					medium	ST318, ST402, Prime 1004, PRG9811	5
					strong	DP332, ST405, Zeta 2	7
					very strong	Alepo, Solera	9
32.	32.	MG	Fiber: elongation				
		QN		99	very small	Celia, DP411	1
				(d)	small	Elsa, Fokion	3
					medium	Intercott 670, Lanovia	5
					large	Armada, Lagiralda	7
					very large	DP414, Etna	9

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
33.	33.	MG	Fiber: fineness		
QN		99	fine	Intercott 195, Intercott 701	3
		(d)	medium	E1, Lagiralda	5
			coarse	Alepo, Solera, DP332, Carla	7
34.		MG	Fiber: length uniformity		
(+)		99	very low		1
QN		(d)	low		3
			medium	Elina, Lydia	5
			high	Alepo, Intercott 701	7
			very high	E1, Elsa	9
35.	34.	VG	Fiber: colour		
QL		99	white	Alepo, Solera	1
			coloured	Rainbow-34	2

8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

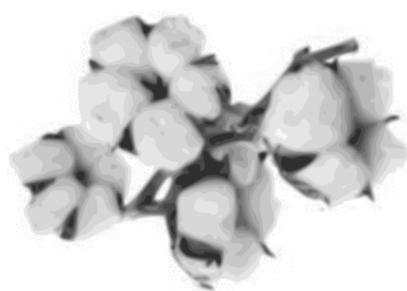
8.1 Explanations covering several characteristics

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

- a) All observations on the flower should be made on the first day of flowering on the first flower of the lowest fruiting branch.
- b) Observations on the leaf and on the stem should be made where leaves are fully extended. Colour observations should be made early in the morning.
- c) Observations on the boll should be made on bolls of the first fruiting position of the first fruiting branch
- d) Observations should be made on delinted cotton according to the Standard Test Methods for Measurement of Physical Properties of Raw Cotton by Cotton Classification Instruments. Designation ASTM D5867-12 (2020) established by the American Society for Testing and Materials (ASTM)

8.2 Explanations for individual characteristics

Ad. 1: Plant: type of flowering



1
clustered



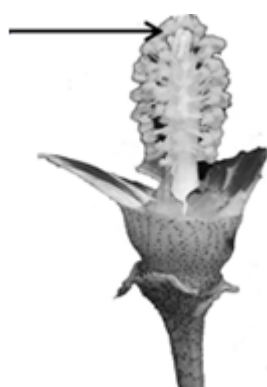
2
semi-clustered



3
non-clustered

Ad. 6: Flower: position of stigma relative to anthers

Observations should be made on the first flower of the lowest fruiting branch.



1
clearly below

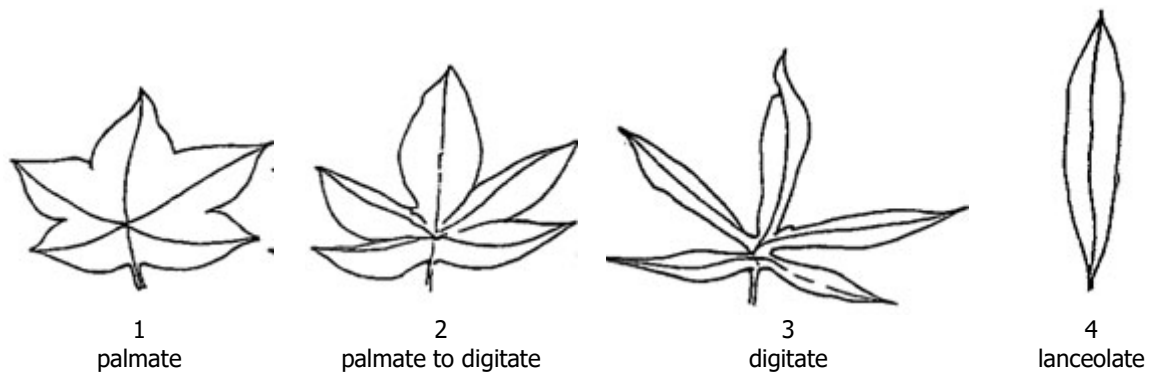


2
same level



3
clearly above

Ad. 9: Leaf: shape



Ad. 10: Leaf: size

Observations should be made on the leaf from the fourth or fifth node from the top of the plant.

Ad. 11: Leaf: pubescence

Observations should be made on the lower side of the leaf.

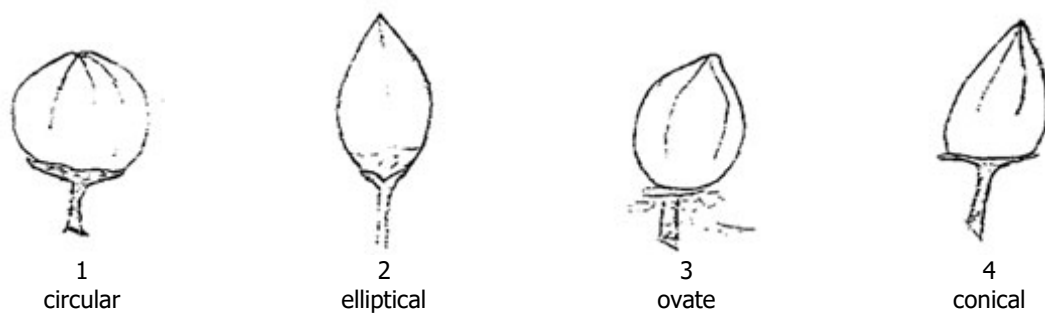
Ad. 14: Stem: colour

Observations should be made on the middle third of the main stem.

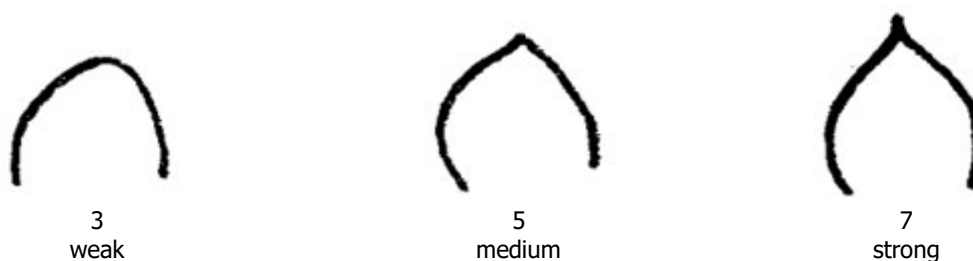
Ad.15: Bract: dentation



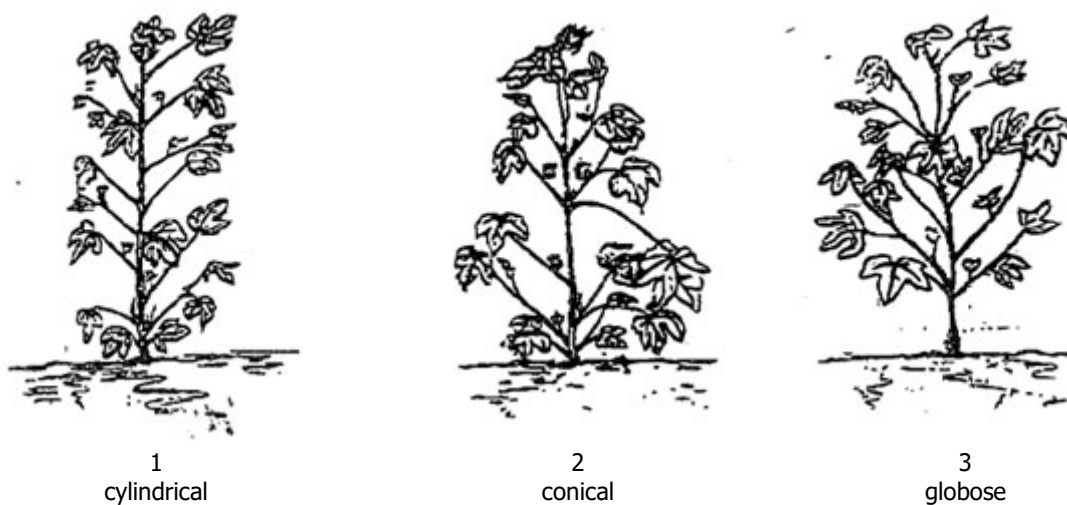
Ad. 18: Boll: shape in longitudinal section



Ad. 21: Boll: prominence of tip



Ad. 22: Plant: shape



Ad. 24: Boll: time of opening of bolls

The time of opening is reached when 50% of the plants have at least one boll opened.

Ad. 28: 100 seeds weight

Observations should be made on delinted seed.

Ad. 29: Boll: content of lint

One sample of 500 grams of seed cotton is collected from each repetition. The sample is collected along the plot from capsules located in first and second position of the lower fruit branches.

The lint is separated from the seeds. The content of lint in the boll is expressed as the percentage of lint in relation to raw cotton.

8.3 Growth stages (Meier, U., 1997)

Code description

Principal growth stage 0: Germination

- 00 Dry seed
- 01 Beginning of seed imbibition
- 03 Seed imbibition complete
- 05 Radicle emerged from seed
- 06 Elongation of radicle
- 07 Hypocotyl with cotyledons breaking through seed coat
- 08 Hypocotyl with cotyledons growing towards soil surface
- 09 Emergence: hypocotyl with cotyledons breaking through soil surface ("crook stage")

Principal growth stage 1: Leaf development (Main shoot)

- 10 Cotyledons completely unfolded¹
- 11 First true leaf unfolded¹
- 12 2nd true leaf unfolded¹
- 13 3rd true leaf unfolded¹
- 1 . Stages continuous till . . .
- 19 9 or more true leaves unfolded;¹ no side shoots visible²

Principal growth stage 2: Formation of side shoots³

- 21 First vegetative side shoot (2nd order) visible
- 22 2 vegetative side shoots (2nd order) visible
- 23 3 vegetative side shoots (2nd order) visible
- 2 . Stages continuous till . . .
- 29 9 or more vegetative side shoots (2nd order) visible

Principal growth stage 3: Main stem elongation (Crop cover)

- 31 Beginning of crop cover: 10% of plants meet between rows
- 32 20% of plants meet between rows
- 33 30% of plants meet between rows
- 34 40% of plants meet between rows
- 35 50% of plants meet between rows
- 36 60% of plants meet between rows
- 37 70% of plants meet between rows
- 38 80% of plants meet between rows
- 39 Canopy closure: 90% of the plants meet between rows

Principal growth stage 5: Inflorescence emergence (Main shoot)

- 51 First floral buds detectable ("pin-head square")⁴
- 52 First floral buds visible ("match-head square")⁴
- 55 Floral buds distinctly enlarged
- 59 Petals visible: floral buds still closed

Principal growth stage 6: Flowering

- 60 First flowers opened (sporadically within the population)
- 61 Beginning of flowering ("Early bloom"): 5–6 blooms / 25 ft of row (= 5–6 blooms / 7.5 meter of row)
- 65 Full flowering: ("Mid bloom"): 11 and more blooms / 25 ft of row = 11 and more blooms / 7.5 meter of row
- 67 Flowering finishing: majority of flowers faded ("Late bloom")
- 69 End of flowering

Principal growth stage 7: Development of fruits and seeds

- 71 About 10% of bolls have attained their final size
- 72 About 20% of bolls have attained their final size
- 73 About 30% of bolls have attained their final size
- 74 About 40% of bolls have attained their final size
- 75 About 50% of bolls have attained their final size
- 76 About 60% of bolls have attained their final size
- 77 About 70% of bolls have attained their final size
- 78 About 80% of bolls have attained their final size
- 79 About 90% of bolls have attained their final size

¹ Leaves are counted from the cotyledon node (= node 0)

² Side shoot development may occur earlier, if there is a vegetative side shoot continue with principal growth stage 2. If there is a reproductive side shoot (fruiting branch) continue with the principal growth stage 5

³ Vegetative side shoots are counted from the cotyledon node

⁴ "pin-head square" or "match-head square" is the first square which forms at the first fruiting position of the first fruiting branch

Principal growth stage 8: Ripening of fruits and seeds

- 80 First open bolls on the first fruiting branches
- 81 Beginning of boll opening: about 10% of bolls open. Nodes Above White Flower (NAWF)
- 82 About 20% of bolls open
- 83 About 30% of bolls open. Nodes Above Cracked Boll (NACB)
- 84 About 40% of bolls open
- 85 About 50% of bolls open
- 86 About 60% of bolls open
- 87 About 70% of bolls open
- 88 About 80% of bolls open
- 89 About 90% of bolls open

Principal growth stage 9: Senescence

- 91 About 10% of leaves discolored or fallen
- 92 About 20% of leaves discolored or fallen
- 93 About 30% of leaves discolored or fallen
- 94 About 40% of leaves discolored or fallen
- 95 About 50% of leaves discolored or fallen
- 96 About 60% of leaves discolored or fallen
- 97 Above ground parts of plant dead; plant dormant
- 99 Harvested product (bolls and seeds)

9. LITERATURE

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10. TECHNICAL QUESTIONNAIRE

The Technical Questionnaire is available on the CPVO website under the following reference:
CPVO-TQ/088/2.