



PROTOCOL FOR TESTS ON DISTINCTNESS, UNIFORMITY AND STABILITY

***Vicia faba* L. var. *equina* St.-Amans
Vicia faba L. var. *minuta* (hort. ex Alef.) Mansf.**

FIELD BEAN; TICK BEAN

UPOV Codes :
VICIA_FAB_EQU
VICIA_FAB_MIN

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Entry into force on 01/06/2019

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CPVO-TP/008/1

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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 *Vicia faba* L. var. *equina* St.-Amans and *Vicia faba* L. var. *minuta* (hort. ex Alef.) Mansf.

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/8/7 dated 20.09.2018 (<https://www.upov.int/edocs/tgdocs/en/tg008.pdf>) for the conduct of tests for Distinctness, Uniformity and Stability.

1.2 Entry into Force

The present protocol enters into force on **01.06.2019**. 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 160 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 Additional tests

In accordance with Article 83(3) of Council Regulation No. 2100/94 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, an additional test may be undertaken providing that a technically acceptable test procedure can be devised.

Additional 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 and pictorial information produced by the EO shall be held and maintained in a form of a database

3.6.2 Living Plant Material

The EO shall collect and maintain living plant material of varieties of the species concerned in the variety collection.

3.6.3 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.

3.6.4 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.

3.6.5 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 by the combined over years distinctness analysis (COYD) the difference between two varieties is clear if the respective characteristics are different at the 1% significance level or less ($p < 0.01$) in a test over either two or three years.

If the conditions for the application of the COYD analyses are not fulfilled, distinctness should be assessed using the 2x1% method.

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 60 plants or parts taken from each of 60 plants and any other observations made on all plants in the test, disregarding any off-type plants.

In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be 1

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 to DUS (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:

If uniformity is assessed by the combined over years uniformity method (COYU) the candidate variety is sufficiently uniform in the respective characteristic if the relative tolerance limit in relation to comparable varieties does not exceed the 2% significance level or less ($p < 0.02$) in a test over two years.

If uniformity is assessed by the combined over years uniformity method (COYU) the candidate variety is sufficiently uniform in the respective characteristic if the relative tolerance limit in relation to comparable varieties does not exceed the 0.2% significance level or less ($p < 0.002$) in a test over three years.

If the conditions of the COYU analysis are not fulfilled, uniformity should be assessed by the relative variance method. For a sample size of 60 plants the threshold level should be 1.6 x variance of comparable varieties.

If uniformity is assessed on the basis of off-types, a population standard of 2% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 160 plants, 6 off-types are allowed.

4.3 Stability

4.3.1 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 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.

4.3.2 Where appropriate, or in cases of doubt, stability may be further examined by testing a new seed or plant 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) Wing: melanin spot (characteristic 4)
- b) Plant: growth type (characteristic 14)
- c) Seed: black pigmentation of hilum (characteristic 22)

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 column 'CPVO N°':

G	Grouping characteristic	- see Chapter 5
QL	Qualitative characteristic	
QN	Quantitative characteristic	
PQ	Pseudo-qualitative characteristic	
(+)	Explanations for individual characteristics	- see Chapter 8.2

For column 'UPOV N°':

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

(*)	UPOV Asterisked characteristic	- Characteristics that are important for the international harmonization of variety descriptions.
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For column 'Stage, method':

MG, MS, VG, VS		- see Chapter 4.1.5
(a)-(c)	Explanations covering several Characteristics	- see Chapter 8.1
19 - 89	Growth stage key	- see Chapter 8.3

7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Example varieties	Note
1. QN	1.	19-61 VG	Foliage: intensity of green colour		
			light	Griffin	1
			medium	Babylon, Wizard	3
			dark	Maris Bead	5
2. QL	2.	19-61 VG	Foliage: greyish hue of green colour		
			absent	Trumpet, Tundra	1
			present	Espresso, Maris Bead	9
3. (+) QN	3. (*)	MG/MS	Time of flowering		
			very early	Louhi, Sampo	1
			early	Boxer, Fuego	3
			medium	Babylon, Obelisk, Tundra	5
			late	Banquise, Griffin	7
			very late	Hiverna	9
4. QL	4. (*)	61-65 VG	Wing: melanin spot		
			absent	Banquise	1
		(a)	present	Trumpet	9
5. PQ	5. (*)	61-65 VG	Wing: colour of melanin spot		
			yellow		1
			(a)	brown	2
			black	Trumpet, Wizard	3
6. (+) QN	6.	61-65 VG	<u>Only varieties with Wing: melanin spot: present:</u> Standard: extent of anthocyanin coloration		
			small	Fuego	1
			(a), (b)	medium	Scoop
			large	Tiffany	5

CPVO N°	UPOV N°	Stage, Method	Characteristics	Example varieties	Note		
7.	7.	61-65	Only varieties with Wing: melanin spot: present: Standard: intensity of anthocyanin coloration				
			QN	VG	weak	Boxer	1
				(a), (b)	medium	Lynx	2
			strong	Maris Bead	3		
8. (+)	8.	61-65	Flower: length				
			QN	MS	short	Espresso, Maris Bead,	3
				(a), (b)	medium	Fuego, Tundra, Vertigo	5
			long	Babylon, Fury	7		
9. (+)	9.	61-65	Standard: width				
			QN	MS/VG	narrow	Laura	1
				(a), (b)	narrow to medium	Fuego	2
					medium	Fabelle	3
					medium to broad	Wizard	4
			broad	Trumpet	5		
10. (+)	10.	61-65	Flower: ratio flower length/standard width				
			QN	MS/VG	low	Lynx	1
				(a), (b)	medium	Fuego	3
			high	Babylon	5		
11.	11. (*)	61-65	Leaflet: length				
			QN	MS	short	Maris Bead, Sampo	3
				(c)	medium	Espresso, Trumpet	5
			long	Honey, Isabell, Maya	7		

CPVO N°	UPOV N°	Stage, Method	Characteristics	Example varieties	Note		
12.	12. (*)	61-65	Leaflet: width				
			QN	MS	narrow	Bumble, Maris Bead	3
				(c)	medium	Espresso, Fury	5
			broad	Honey, Isabell	7		
13.	13.	61-69	<u>Only varieties with Wing: melanin spot: present: Stem: anthocyanin colouration</u>				
			QN	VG	absent or weak	Trumpet	1
					medium	Pyramid, Scoop, Wizard	3
			strong	Griffin, Louhi	5		
14. (+)	14. (*)	71-81	Plant: growth type				
			QL	VG	determinate	Titus	1
			indeterminate	Wizard	2		
15.	15. (*)	71-81	Plant: length				
			QN	MG/MS	short	Louhi	3
					medium	Fuego, Obelisk	5
			long	Bumble, Olan	7		
16. (+)	16.	71-81	Stem: number of nodes				
			QN	MS	few	Louhi	3
					medium	Isabell	5
			many	Hiverna, Tundra	7		
17. (+)	17. (*)	71-80	Pod: length				
			QN	MS/VG	short	Divine, Fury	3
				(b)	medium	Fanfare, Griffin	5
			long	Babylon, Wizard	7		

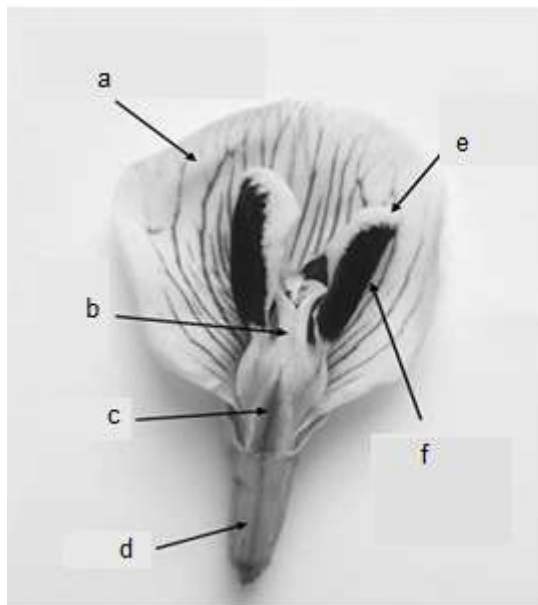
CPVO N°	UPOV N°	Stage, Method	Characteristics	Example varieties	Note		
18. (+)	18.	71-80	Pod: width				
			QN	MS/VG	narrow	Kontu	3
				(b)	medium	Scoop	5
			broad	Bumble, Clipper	7		
19.	19.	71-80	Pod: intensity of green colour				
			QN	VG	light	Volantin	1
				(b)	medium	Palacio	2
			dark	Vitabon, Tiffany	3		
20. (+)	20. (*)	89	Seed: shape				
			QL	VG	circular	Maris Bead	1
			non-circular	Bumble, Fury	2		
21. (+)	21. (*)	89	Seed: colour of testa				
			PQ	VG	light yellow brown	Trumpet, Wizard	1
					grey	Organdi, Taifun	2
					green		3
			black		4		
22.	22. (*)	89	Seed: black pigmentation of hilum				
			QL	VG	absent	Fuego, Trumpet	1
			present	Clipper, Maris Bead	9		
23.	23. (*)	89	100 seed weight				
			QN	MG	very low	Kontu, Sampo	1
					low	Diana, Louhi	3
					medium	Babylon, Fury, Sultan	5
					high		7
			very high	Bumble, Clipper	9		

8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

8.1 Explanations covering several characteristics

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

a)



a = Standard petal
b = Keel petal
c = Sepal
d = Calyx
e = Wing petal
f = Wing melanin spot

b) Observations should be made at the second flowering node

c) Measurements should be made on the basal pair of leaflets of the leaf at the second flowering node. If there is any difference in size between the pairs of leaflets, the largest should be observed.

8.2 Explanations for individual characteristics

Ad. 3: Time of flowering

Time of flowering is reached when 50% of the plants have at least one open flower.

Ad. 6: Only varieties with Wing: melanin spot: present: Standard: extent of anthocyanin colouration



1
small



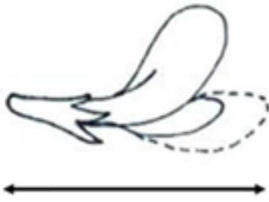
3
medium



5
large

Ad. 8: Flower: length

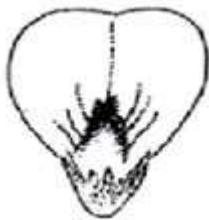
The standard should be flattened for assessment of the length



Ad. 9: Standard: width



Ad. 10: Flower: ratio flower length/standard width



1
low



3
medium



5
high

Ad. 14: Plant: growth type



1
determinate



2
indeterminate

Ad. 16: Stem: number of nodes

Observations should be made up to and including the first flowering node.

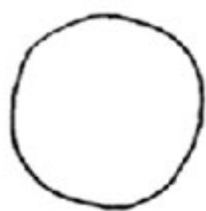
Ad. 17: Pod: length

Pod length should be assessed excluding beak.

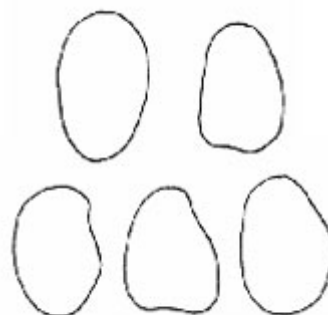
Ad. 18: Pod: width

Pod width should be assessed at the widest point from suture to suture.

Ad. 20: Seed: shape



1
circular



2
Non circular

Ad. 21: Seed: colour of testa

Observation should be made immediately after harvest and before drying. Seeds that are light yellow brown become brown with age if they contain tannin.

8.3 Phenological growth stages and BBCH-identification keys of *Vicia faba* L. (Meier, 1997)

Code	Description
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Principal growth stage 0: Germination

00	Dry seed
01	Beginning of seed imbibition
02	–
03	Seed imbibition complete
04	–
05	Radicle emerged from seed
06	–
07	Shoot emerged from seed (plumule apparent)
08	Shoot growing towards soil surface
09	Emergence shoot emerges through soil surface

Principal growth stage 1: Leaf development¹

10	Pair of scale leaves visible (may be eaten or lost)
11	First leaf unfolded
12	2 leaves unfolded
13	3 leaves unfolded
14	4 leaves unfolded
15	5 leaves unfolded
16	6 leaves unfolded
17	7 leaves unfolded
18	8 leaves unfolded
19	9 or more leaves unfolded

Principal growth stage 2: Formation of side shoots

20	No side shoots
21	Beginning of side shoot development: first side shoot detectable
22	2 side shoots detectable
23	3 side shoots detectable
24	4 side shoots detectable
25	5 side shoots detectable
26	6 side shoots detectable
27	7 side shoots detectable
28	8 side shoots detectable
29	End of side shoot development: 9 or more side shoots detectable

Principal growth stage 3: Stem elongation

30	Beginning of stem elongation
31	One visibly extended internode ²
32	2 visibly extended internodes
33	3 visibly extended internodes
34	4 visibly extended internodes
35	5 visibly extended internodes
36	6 visibly extended internodes
37	7 visibly extended internodes
38	8 visibly extended internodes
39	9 or more visibly extended internodes

Principal growth stage 4: -----

Principal growth stage 5: Inflorescence emergence

50	Flower buds present, still enclosed by leaves
51	First flower buds visible outside leaves
52	–
53	–
54	–
55	First individual flower buds visible outside leaves but still closed
56	–
57	–
58	–
59	First petals visible, many individual flower buds, still closed

Principal growth stage 6: Flowering

- 60 First flowers open
- 61 Flowers open on first raceme
- 62 –
- 63 Flowers open on 3 racemes per plant
- 64 –
- 65 Full flowering: flowers open on 5 racemes per plant
- 66 –
- 67 Flowering declining
- 68 –
- 69 End of flowering

Principal growth stage 7: Development of fruit

- 70 First pods have reached final length ("flat pod")
- 71 10% of pods have reached final length
- 72 20% of pods have reached final length
- 73 30% of pods have reached final length
- 74 40% of pods have reached final length
- 75 50% of pods have reached final length
- 76 60% of pods have reached final length
- 77 70% of pods have reached final length
- 78 80% of pods have reached final length
- 79 Nearly all pods have reached final length

Principal growth stage 8: Ripening

- 80 Beginning of ripening: seed green, filling pod cavity
- 81 10% of pods ripe, seeds dry and hard
- 82 20% of pods ripe, seeds dry and hard
- 83 30% of pods ripe and dark, seeds dry and hard
- 84 40% of pods ripe and dark, seeds dry and hard
- 85 50% of pods ripe and dark, seeds dry and hard
- 86 60% of pods ripe and dark, seeds dry and hard
- 87 70% of pods ripe and dark, seeds dry and hard
- 88 80% of pods ripe and dark, seeds dry and hard
- 89 Fully ripe: nearly all pods dark, seeds dry and hard

Principal growth stage 9: Senescence

- 90 –
- 91 –
- 92 –
- 93 Stems begin to darken
- 94 –
- 95 50% of stems brown or black
- 96 –
- 97 Plant dead and dry
- 98 –
- 99 Harvested product

1 Stem elongation may occur earlier than stage 19; in this case continue with the principal stage 3.

2 First internode extends from the scale leaf node to the first true leaf node.

9. LITERATURE

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10. TECHNICAL QUESTIONNAIRE

The Technical Questionnaire is available on the CPVO website under the following reference:
CPVO/TQ-008/1.