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English
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EUROPEAN UNION

COMMUNITY PLANT VARIETY OFFICE

PROTOCOL FOR DISTINCTNESS, UNIFORMITY AND STABILITY TESTS

***Pisum sativum* L. sensu lato**

PEA

UPOV Species Code: PISUM_SAT

Adopted on 06/11/2003

I - SUBJECT OF THE PROTOCOL

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 general UPOV Document TG/1/3 and UPOV Guideline TG/7/9 + Corr. dated 4th November 1994 + 18th October 1996 for the conduct of tests for Distinctness, Uniformity and Stability. This protocol applies to varieties of ***Pisum sativum*** **L. sensu lato**.

II - SUBMISSION OF SEED AND OTHER PLANT MATERIAL

1 The Community Plant Variety Office (CPVO) is responsible for informing the applicant of:

- the closing date for the receipt of plant material;
- the minimum amount and quality of plant material required;
- the Examination Office to which material is to be sent.

A sub-sample of the material submitted for test will be held in the variety collection of the Examination Office as the definitive sample of the candidate variety.

The applicant is responsible for ensuring compliance with any customs and plant health requirements.

2. Final dates for receipt of documentation and material by the Examination Office

The final dates for receipt of requests, technical questionnaires and the final date or submission period for plant material will be decided by the CPVO and each Examination Office chosen.

The Examination Office is responsible for immediately acknowledging the receipt of requests for testing, and technical questionnaires. Immediately after the closing date for the receipt of plant material the Examination Office should inform the CPVO if no plant material has been received. However, if unsatisfactory plant material is submitted the CPVO should be informed as soon as possible.

3. Seed requirements

Information with respect to closing dates and submission requirements of plant material for the technical examination of varieties can be found on the CPVO web site (www.cpvo.europa.eu) and in the special Issue S2 of the Official Gazette of the Office published yearly at the month of September.

Quality of seed: ..... Should not be less than the standards laid down for certified seed in Annex 2 of EC Directive 70/458 (vegetable peas) and 66/401 (agricultural peas).

Seed Treatment:..... The plant material must not have undergone any treatment unless the CPVO and the Examination Office allow or request such treatment. If it has been treated, full details of the treatment must be given.

Labelling of sample:..... - Species
- File number of the application allocated by the CPVO
- Breeder's reference
- Examination reference (if known)
- Name of applicant
- The phrase "On request of the CPVO".
- In the case of a split sample, the quantity of seed being submitted[1].

III - CONDUCT OF TESTS

1. Variety collection

A variety collection will be maintained for the purpose of establishing distinctness of the candidate varieties in test. A variety collection may contain both living material and descriptive information. A variety will be included in a variety collection only if plant material is available to make a technical examination.

Pursuant to Article 7 of Council Regulation No. 2100/94, the basis for a collection should be the following:

- varieties listed or protected at the EU level or at least in one of the EEA Member States;
- varieties protected in other UPOV Member States;
- any other variety in common knowledge.

The composition of the variety collection in each Examination Office depends on the environmental conditions in which the Examination Office is located.

Variety collections will be held under conditions which ensure the long term maintenance of each accession. It is the responsibility of Examination Offices to replace reference material which has deteriorated or become depleted. Replacement material can only be introduced if appropriate tests confirm conformity with the existing reference material. If any difficulties arise for the replacement of reference material Examination Offices must inform the CPVO. If authentic plant material of a variety cannot be supplied to an Examination Office the variety will be removed from the variety collection.

2. Material to be examined

Candidate varieties will be directly compared with other candidates for Community plant variety rights tested at the same Examination Office, and with appropriate varieties in the variety collection. When necessary an Examination Office may also include other candidates and varieties. Examination Offices should therefore make efforts to co-ordinate the work with other offices involved in DUS-testing of Peas. There should be at least an exchange of technical questionnaires for each candidate variety, and during the test period, Examination Offices should notify each other and the CPVO of candidate varieties which are likely to present problems in establishing distinctness. In order to solve particular problems Examination Offices may exchange plant material.

3. 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. In the latter case, the CPVO should be informed. In addition the existence of some other regulation e.g. plant health, may make the observation of the characteristic impossible.

The Administrative Council empowers the President, in accordance with Article 23 of Commission Regulation N° 1239/95, to insert additional characteristics and their expressions in respect of a variety.

4. Grouping of varieties

The varieties and candidates to be compared will 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 and which in their various states of expression are fairly evenly distributed throughout the collection. In the case of continuous grouping characteristics overlapping states of expression between adjacent groups is required to reduce the risks of incorrect allocation of candidates to groups. The characteristics that could be used for grouping are the following: (CPVO numbering; G for grouping in the table of characteristics)

a) Seed: shape of starch grain (characteristic 2)

b) Seed: colour of cotyledon (characteristic 3)

c) Varieties with anthocyanin only: Seed: marbling of testa (characteristic 4)

d) Varieties with anthocyanin only: Seed: violet or pink spots on testa (characteristic 5)

e) Seed: black colour of hilum (characteristic 6)

f) Plant: anthocyanin coloration (characteristic 9)

g) Leaf: leaflets (characteristic 19)

h) Stipule: type of development (characteristic 28)

i) Stipule: 'rabbit-eared' stipules (characteristic 29)

j) Stipule: flecking (characteristic 33)

k) Pod: parchment (characteristic 50)

l) Varieties with no or partial parchment only: Pod: thickened wall (characteristic 51)

m) Varieties without thickened pod wall only: Pod: shape of distal part (characteristic 54)

n) Pod: colour (characteristic 55)

o) Pod: intensity of green colour of immature seed (characteristic 61)

p) Resistance to Fusarium oxysporum f. sp. pisi Race 1
(for vegetable varieties only, characteristic 66.1)

5. Trial designs and growing conditions

The minimum duration of tests will normally be two independent growing cycles. Tests will be carried out under conditions ensuring normal growth. The size of the plots will be such that plants or parts of plants may be removed for measuring 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 a total of 100 plants, divided between two replicates.
All observations determined by measurement or counting should be made on 20 plants or parts of 20 plants.

6. Special 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, 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.

7. Standards for decisions

a) **Distinctness**

A candidate variety will be considered to be distinct if it meets the requirements of Article 7 of Council Regulation No. 2100/94.

Qualitative characteristics:

In the case of characteristics which show discrete discontinuous states of expression, a difference between two varieties is clear if the respective characteristics have expressions which fall into two different states.

Quantitative characteristics:

Characteristics which show a continuous range of expression from one extreme to the other may be either measured or visually observed.

In the case of visually observed characteristics, a difference between two varieties is clear if the expression of the respective characteristics differs by at least the span of one note, taking into account the variability observed within the varieties.

If distinctness is assessed using the t-test least significant difference the difference between two varieties is clear if it occurs with the same sign at the 1% significance level or less ($p \leq 0.01$) in two consecutive or two out of three growing cycles.

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 ($p \leq 0.01$) in a test over either two or three years.

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

b) **Uniformity**

A candidate will be considered to be sufficiently uniform if the number of off-types does not exceed the number of plants as indicated in the table below (A population standard of 1% and an acceptance probability of ≥ 95% should be applied).

Table of maximum numbers of off-types allowed for uniformity standards

Number of plants	off-types allowed
6-35	1
36-82	2
83-137	3
138 – 198	4
199 - 262	5

c) **Stability**

A candidate will be considered to be sufficiently stable when there is no evidence to indicate that it lacks uniformity.
Seed samples of further submissions included in any test must show the same expression of characteristics as the material originally supplied.

IV - REPORTING OF RESULTS

After each recording season the results will be summarised and reported to the CPVO in the form of a UPOV model interim report in which any problems will be indicated under the headings distinctness, uniformity and stability. Candidates may meet the DUS standards after two growing periods but in some cases three growing periods may be required. When tests are completed the results will be sent by the Examination Office to the CPVO in the form of a UPOV model final report.

If it is considered that the candidate complies with the DUS standards, the final report will be accompanied by a variety description in the format recommended by UPOV. If not the reasons for failure and a summary of the test results will be included with the final report.

The CPVO must receive interim reports and final reports by the date agreed between the CPVO and the Examination Office.

Interim reports and final examination reports shall be signed by the responsible member of the staff of the Examination Office and shall expressly acknowledge the exclusive rights of disposal of CPVO.

V - LIAISON WITH THE APPLICANT

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.

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ANNEXES TO FOLLOW

ANNEX I

PAGE

ANNEX II

ANNEX I

TABLE OF CHARACTERISTICS TO BE USED IN DUS TEST AND PREPARATION OF DESCRIPTIONS

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
1.	**1.**	**00**	**Seed: shape**		
			spherical	Chipeau, Lisana	1
			ovoid	Birte, Solara	2
			cylindrical	Span, Timo	3
			rhomboid	Maro, Progreta	4
			triangular	Protor	5
			irregular	Géant à fleur violette	6
2.	**2.**	**00**	**Seed: shape of starch grain**		
(+)[2]			simple	Maro, Solara, Zorba	1
G			compound	Avola, Polar	2
3.	**3.**	**00**	**Seed: colour of cotyledon**		
(+)			green	Avola, Solara	1
G			yellow	Birte, Nadja	2
4.	**4.**	**00**	**Varieties with anthocyanin only: Seed: marbling of testa**		
(+)			absent	Nadja	1
G			present	Tombola	9
5.	**5.**	**00**	**Varieties with anthocyanin only: Seed: violet or pink spots on testa**		
(+)			absent	Nadja, Tombola	1
			faint	Assas, Susan	2
G			intense	Arvika, Livia	3

[1] The optimum stage of observation is indicated by numbers. Explanations are given in Annex 1 in 'Explanations and Methods'.
[2] See explanations in Annex 1 in 'Explanations and Methods'

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
6.	**6.**	**00**	**Seed: black colour of hilum**		
(+)			absent	Avola, Nadja	1
G			present	Nofila, Poneka	9
7.	**7.**	**00**	**Varieties with anthocyanin only: Seed: colour of testa**		
(+)			reddish brown	Golf, Rosakrone	1
			brown	Poneka	2
			brownish green	Lisa, Susan	3
8.	**8.**	**00**	**Varieties with unwrinkled seed and simple starch grains only: Seed : dimpled cotyledons**		
(+)			absent	Birte, Solara	1
			present	Maro, Progreta	9
9.	**9.**	**00-320**	**Plant: anthocyanin coloration**		
(+)			absent	Avola, Solara	1
G			present	Nadja, Rosakrone	9
10.	**10.**	**218**	**Plant: height**		
(+)			very short	Elma	1
			short	Birte, Mini	3
			medium	Lord Chancellor, Minor	5
			tall	Blauwschokker, Livia	7
			very tall	Enka	9
11.	**11.**	**30-199**	**Stem: fasciation**		
			absent	Avola	1
			present	Golf, Rosakrone	9

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
12.	**12.**	**240**	**Stem: length**		
(+)			very short	Elma	1
			short	irte, Mini	3
			medium	Lord Chancellor, Minor	5
			long	Blauwschokker, Livia	7
			very long	Enka	9
13.	**13.**	**230-240**	**Stem: number of nodes up to and including first fertile node**		
(+)			very few	Challis	1
			few	Miragreen, Waverking	3
			medium	Rampart, Susan	5
			many	Enka, Poneka	7
			very many	Regina	9
14.	**14.**	**30-240**	**Varieties with anthocyanin only: Stem: anthocyanin coloration of axil**		
			absent	Avola, Maro	1
			present	Assas, Caroubel	9
15.	**15.**	**30-240**	**Varieties with anthocyanin only: Stem: type of anthocyanin coloration of axil**		
			single ring	Assas, Nadja	1
			double ring	Caroubel, Enka	2
16.	**16.**	**40-240**	**Foliage: colour**		
			yellow green	Pilot	1
			green	Avola, Nadja	2
			blue green	Polar	3

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
17.	**17.**	**40-240**	**Foliage: intensity of colour (excluding yellow-green and blue-green varieties)**		
(+)			light	Angelica, Enka	3
			medium	Lisa, Rondo	5
			dark	Waverex	7
18.	**18.**	**40-240**	**Foliage: greyish hue**		
			absent	Lisa	1
			present	Filby, Solara	9
19.	**19.**	**20-240**	**Leaf: leaflets**		
			absent	Rampart, Solara	1
G			present	Avola, Nadja	9
20.	**20.**	**30-240**	**Leaf: waxiness of surface of upper leaflet**		
			absent	Citrina	1
			present	Avola, Maro	9
21.	**21.**	**30-240**	**Leaf: average maximum number of leaflets**		
(+)			few	Jof	3
			medium	Dark Skin, Perfection, Finale	5
			many	Triad	7
22.	**22.**	**216-216**	**Leaflet: size**		
(+)			very small		1
			small	Mini	3
			medium	Finale	5
			large	Alderman	7
			very large	Chieftain	9

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
23.	**23.**	**216-226**	**Leaflet: length**		
(+)			short	Polar, Resco	3
			medium	Bohatyr, Fridgit	5
			long	Angelica, Chieftain	7
24.	**24.**	**216-226**	**Leaflet: width**		
(+)			narrow		3
			medium		5
			broad		7
25.	**25.**	**216-226**	**Leaflet: distance from widest point to base**		
(+)			short	Atlas, Resco	3
			medium	Jade, Maro	5
			long	Edula, Salome	7
26.	**26.**	**30-240**	**Leaflet: dentation**		
			absent	Allround, Amino	1
			present	Carpo, Sugar Gem	9
27.	**27.**	**30-240**	**Leaflet: degree of dentation**		
(+)			very weak	Progreta	1
			weak	Carpo, Edula	3
			medium	Miracle	5
			strong	Cisca	7
			very strong	Sugar Gem	9
28.	**28.**	**30-240**	**Stipule: type of development**		
			rudimentary	Filby	1
G			well developed	Avola, Progreta, Solara	2
29.	**29.**	**30-240**	**Stipule: 'rabbit-eared' stipules**		
(+)			absent	Birte, Nadja	1
G			present	Progreta	9

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
30.	**30.**	**30-240**	**Stipule: waxiness of surface of upper stipule**		
			absent	Roi des Serpettes	1
			present	Avola, Maro	9
31.	**31.**	**216-226**	**Stipule: length**		
(+)			short	Lentiroy, Resco	3
			medium	Mars, Timo	5
			long	Alderman, Sugar Snap	7
32.	**32.**	**216-226**	**Stipule: width**		
(+)			narrow	Lentiroy, Resco	3
			medium	Mars, Timo	5
			broad	Erylis, Jade	7
33.	**33.**	**20-240**	**Stipule: flecking**		
			absent	Lisa, Orfac	1
G			present	Avola, Maro	9
34.	**34**	**20-240**	**Stipule: maximum density of flecking**		
(+)			very sparse	Progreta, Resco	1
			sparse	Allround, Finale	3
			medium	Mars, Sentinel	5
			dense	Avola, Roi de Carouby	7
			very dense		9
35.	**35.**	**216-226**	**<u>Varieties without leaflets only</u>: Petiole: length (from axil to the first tendril)**		
(+)			short	Esa, Rampart	3
			medium	Sentinel, Solara	5
			long	Dryden	7

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
36.	**36.**	**214**	**Time of flowering**		
(+)			very early	Orfac	1
			early	Span, Sprite	3
			medium	Finale, Waverex	5
			late	Atlas, Poneka	7
			very late	Regina	9
37.	**37.**	**216-226**	**Non-fasciated varieties only: Plant: maximum number of flowers per node**		
(+)			one	Elma, Sprite	1
			one to two		2
			two	Birte, Maro	3
			two to three		4
			three	Sentinel, Waverking	5
			three to four		6
			more than four		7
38.	**38.**	**216-218**	**Varieties with anthocyanin only: Flower: anthocyanin coloration of wing**		
			pink-blush	Golf	1
			pink	Rosakrone	2
			reddish purple	Assas	3
39.	**39.**	**216-218**	**Reddish purple flowered varieties only: Flower: intensity of reddish purple coloration of wing**		
			weak	Salome	3
			medium	Susan	5
			strong	Assas	7

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
40.	**40.**	**216-218**	**<u>Reddish purple flowered varieties only</u>: Flower: intensity of colour of standard**		
			weak	Parvus	3
			medium	Arvika	5
			strong	Lisa	7
41.	**41.**	**216-218**	**<u>Varieties without anthocyanin only</u>: Flower: colour of standard**		
(+)			white	Belinda, Record	1
			white to cream	Maro, Sprite	2
			cream	Orcado	3
42.	**42.**	**216-218**	**Flower: maximum width of standard**		
(+)			narrow	Progreta	3
			medium	Carpo, Imposant	5
			broad	Pilot, Sugar Snap	7
43.	**43.**	**216-218**	**Flower: shape of base of standard**		
(+)			strongly raised		1
			raised	Progreta, Salome	3
			level	Atlas, Solara	5
			arched	Avola, Helka	7
			strongly arched	Bohatyr	9
44.	**44.**	**216-218**	**Flower: intensity of undulation of standard**		
(+)			absent or very weak	Heron, Maxi	1
			weak	Accord, Micro	3
			medium	Adamus, Alex	5
			strong	Frijaune, Koka	7
			very strong	Téléphone nain, Télévision	9

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
45.	**45.**	**216-226**	**Flower: width of sepale**		
			narrow	Abador	3
			medium	Conservor	5
			broad	Amino	7
46.	**46.**	**212-240**	**Flower: shape of apex of upper sepal (at second flowering node)**		
			acuminate	Dawn	1
			pointed	Kelvedon Wonder	2
			rounded	Imperiala	3
47.	**47.**	**218-224**	**Flower: length of peduncle from stem to first flower**		
(+)			short	Atlas, Resco	3
			medium	Bohatyr, Maro	5
			long	Avola, Sugar Snap	7
48.	**48.**	**240**	**Pod: length (as for 46)**		
			very short	NFG Krupp Pelushke, Waverex	1
			short	Driad, Solara	3
			medium	Atlas, Jof	5
			long	Hurst Green Shaft, Protor	7
			very long	Roi de Carouby	9
49.	**49.**	**240**	**Pod: maximum width (as for 46)**		
(+)			very narrow	Waverex	1
			narrow	Arvika, Resco	3
			medium	Nofila, Orfac	5
			broad	Pilot, Reuzensuiker	7
			very broad	Roi de Carouby	9

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
50.	**50.**	**310**	**Pod: parchment**		
(+)			absent	Orlex, Sugar Gem	1
			partially present		2
G			entirely present	Avola, Solara	3
51.	**51.**	**240**	**Varieties with no or partial parchment only: Pod: thickened wall**		
(+)			absent	Nofila, Reuzensuiker	1
G			present	Edula, Sugar Snap	9
52.	**52.**	**240**	**Pod: degree of curvature**		
(+)			absent or very weak	Finale, Maro	1
			weak	Esa, Span	3
			medium	Audrey, Sentinel	5
			strong	Hurst Green Shaft	7
			very strong	Curlew, Edula	9
53.	**53.**	**240**	**Pod: type of curvature**		
(+)			concave	Curlew, Edula	1
			convex		2
54.	**54.**	**240**	**Varieties without thickened pod wall only: Pod: shape of distal part**		
(+)			pointed	Jof, Orfac	1
G			blunt	Avola, Solara	2
55.	**55.**	**240**	**Pod: colour**		
			yellow	Orlex	1
			green	Avola, Solara	2
			blue-green	Miracle, Miragreen	3
G			purple	Blauwschokker	4

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
56.	**56.**	**240**	**Pod: intensity of green colour**		
(+)			light	Solara	3
			medium		5
			dark	Kasino, Perfection	7
57.	**57.**	**240-245**	**Varieties with no or partial parchment only: Pod: strings of suture**		
(+)			absent or rudimentary	Nofila, Sugar Gem	1
			present	Reuzensuiker, Sugar Snap	9
58.	**58.**	**240-255**	**Varieties with anthocyanin only: Pod: anthocyanin coloration of suture**		
(+)			absent	Imposant	1
			present	Lisa, Nadja	9
59.	**59.**	**240-255**	**Varieties with anthocyanin only: Pod: spots of anthocyanin coloration on outer wall**		
(+)			absent	Imposant, Lisa	1
			present	Nadja, Roi de Carouby	9
60.		**230-240**	**Pod: number of ovules**		
(+)			few	NFG Krupp Peluschke	3
			medium	Arvika, Birte	5
			many	Dinos	7
61.	**61.**	**230-240**	**Pod: intensity of green colour of immature seed**		
(+)			light	Perfection, Solara	3
			medium		5
G			dark	Dark Skin Perfection, Kasino	7

CPVO N°	UPOV N°	Stage[1]	Characteristics	Examples	Note
62.	**62.**	**320**	**Seed: time of maturity**		
(+)			very early		1
			early	Belinda, Bodil	3
			medium	Finale, Livia	5
			late	Minor	7
			very late	NFG Krupp Peluschke	9
63.	**63.**	**320**	**Seed: wrinkling of cotyledon**		
(+)			absent	Maro, Solara	1
			present	Avola, Zorba	9
64.	**64.**	**320**	**Seed: degree of wrinkling of cotyledon**		
			weak	Audry	3
			medium	Mini	5
			strong	Avanta, Elma	7
65.	**65.**	**320**	**Seed: weight**		
(+)			very small	Douroy	1
			small	Cherger, Livia	3
			medium	Bondi, Edula	5
			large	Maro, Tombola	7
			very large	Imposant	9

Note: Resistance characteristics are facultative, only those marked with an asterisk (*) are compulsory for vegetable peas.
In general for the assessment of resistance characteristics, the facilities of other Examination Offices or specialised institutions might be used, subject to previous arrangements.
Some characteristics may be discarded: if there are already phytosanitary restrictions.

CPVO N°	UPOV N°	Stage[3]	Characteristics	Examples	Note
66.	**66.**		**Resistance to <u>Fusarium oxysproum f. sp. pisi</u>**		
***66.1**	**66.1**		**Race 1**		
			absent	JI 1365 ex cv., Little Marvel	1
G			present	JI 1362 ex cv., DarkSkin Perfection	9
66.2	**66.2**		**Race 2**		
			absent	JI 1363 ex WSU 28	
			present	JI 1364 ex WSU 23	
66.3	**66.3**		**Race 5**		
			absent	JI 1365 ex cv., Little Marvel	
			present	JI 1364 ex WSU 23	
66.4	**66.4**		**Race 6**		
			absent	JI 1365 ex cv., Little Marvel	
			present	JI 1363 ex WSU 28	
67.	**67.**		**Resistance to <u>Erysiphe pisi</u> Syd.**		
(+)			absent	JI 502 ex cv Rondo	
			present	JI 1559 ex Mexique 4	
68.	**68.**		**Resistance to <u>Ascochyta pisi,</u> race C**		
(+)			absent	JI 394 ex cv., Kelvedon Wonder	
			present	JI 502 ex cv. Rondo	

[3] The optimum stage of observation is indicated by numbers. Explanations are given in Annex 1 in 'Explanations and Methods'.

CPVO N°	UPOV N°	Stage[3]	Characteristics	Examples	Note
69. (+)	**69.**		**Resistance to <u>Pseudomonas syringae pv. pisi</u>**		
69.1	**69.1**		**Pathovar 2**		
			absent	JI 2430 ex cv., Kelvedon Wonder	
			present	JI 2431 ex cv., Early Onward	
69.2	**69.2**		**Pathovar 4**		
			absent	JI 2431 ex cv., Early Onward	
			present	JI 2439 ex cv., Fortune	
70. (+)	**70.**		**Resistance to Seed-borne Mosaic Virus (BSbmV), Strain P1**		
			absent	JI 363 ex cv., Lincoln	
			present	JI 968 ex WBH 1779	
71. (+)	**71.**		**Resistance to Bean Yellow Mosaic Virus (BYMV)**		
			absent	JI 502 ex cv. Rondo	
			present	JI 394 ex cv., Kelvedon Wonder	
72. (+)	**72.**		**Resistance to Pea Entaion Mosaic Virus (PEMV)**		
			absent	ex cv. Dark Skin Perfection	
			present	ex cv. Perfected Freezer 60	

EXPLANATIONS AND METHODS

For further genetic and additional background information please refer to the Annex of the UPOV guideline 'Peas' TG/7/9, 94-11-04.

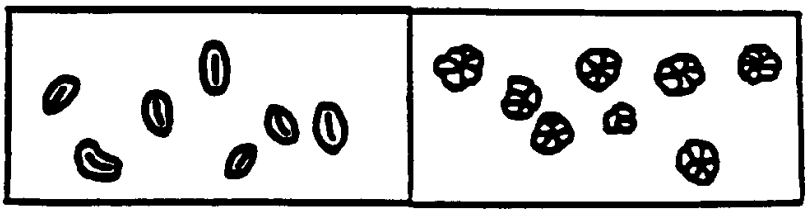
Ad 2: Seed: shape of starch grain

(1) After removing the testa, fine fragments of tissue should be extracted from the cotyledon and examined after having added a droplet of water and squashed them gently between two microscope slides. Too much pressure during squashing results in fragmentation of the grains; too little pressure will not provide a layer thin enough for easy examination.

(2) A microscope with transmitted light, using X16 eye-pieces and either X10 or X40 objectives, is most suitable for examination. For examination of compound grains the larger objectives will be required.

(3) Simple grains resemble wheat seeds or coffee beans in shape, often with what looks like a suture line running along their length.

(4) Compound grains look irregularly star-shaped and appear segmented. The centre of the grains may appear cross-shaped.



1
simple starch grains

2
compound starch grains

Ad 3 – 7: Observation of dry seed characteristics

The provided seed should be mature and preferably not severely bleached, the assessment should be carried out within nine months after harvest. For varieties with anthocyanin pigment, tannins in the testa often darken with age, (usually after nine months) obscuring many characteristics. The observation is most clear under conditions of bright natural daylight.

Ad 5: Seed: violet or pink spots on testa

Only clearly defined faint or intense spots--which are usually violet due to the presence of anthocyanin--should be recorded. In presence of the dominant gene obscurum single seeds may be completely or partly anthocyanin coloured. Plants having such seeds should not be considered as off-types.

Ad 6: Seed: black colour of hilum

The hilum area should be lightly polished with a cloth before recording, if any loose tissue is present.

Ad 8: Seed: dimpled cotyledons

To be observed on dry seed sent in by the applicant. Seed should not be immature. Dimpling is recorded as present when the seed surface is very slightly "rippled."

Ad 9: Plant: anthocyanin coloration

The anthocyanin coloration should be recorded as present if anthocyanin occurs in one or more of the following: seed, foliage, stem, axils, flower or pod.

Ad 10: Plant: height

The observations should be made when approximately 30% of the plants have one flower open.

Ad 12+13: Stem: length and Stem: number of nodes

The observations should be made on harvested plants at mature green seed stage. The observations should include nodes with scale leaves. The first two nodes, which have “scale” leaves, should be included in any count.

Ad 17: Foliage: intensity of colour

Yellow-green and blue-green varieties should be excluded since the extremes of the range can be difficult to discriminate from the expression of yellow-green and blue-green foliage without reference to example varieties.

Ad 21: Leaf: average maximum number of leaflets

The maximum expression should be recorded over the whole plant. The maximum number of leaflets for a sample of plants should be recorded and an average value calculated.

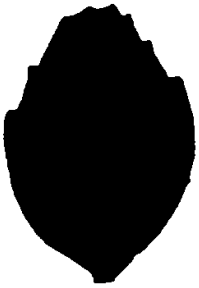
Ad 22-25: Leaflet: size (22), length (23), width (24), distance from widest point to base(25)

The observations should be made at the second fertile node.

Ad 27: Leaflet: degree of dentation

The observations should be made over the main stem above the sixth node.

1
very weak



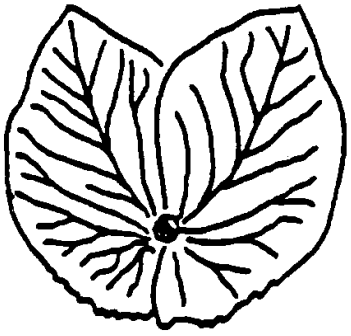
3
weak

5
medium

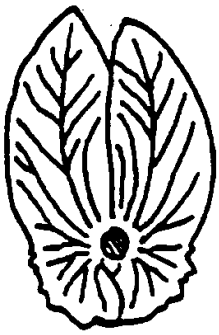
7
strong

9
very strong

Ad 29: Stipule: 'rabbit-eared' stipules



1
absent



9
present

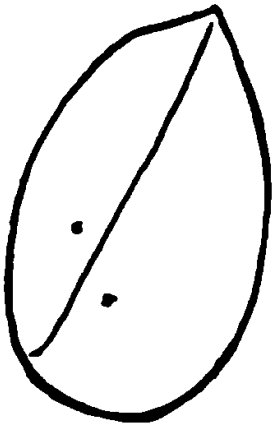
Stipules are parallel, rather than divergent, with pointed tips.

Ad 31 + 32: Stipule: length (31) and width (32)

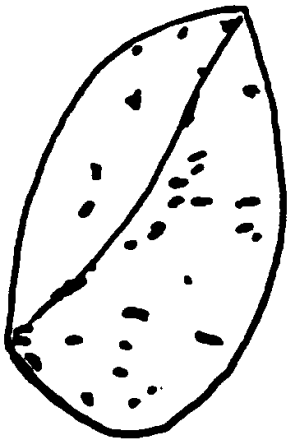
The observations should be made at the second fertile node on stipules which have been detached from the plant and flattened. The maximum width should be recorded.

Ad 34: Stipule: maximum density of flecking

The observations should be made over the whole plant. Care has to be taken that foliage at the lowest nodes has not senesced before assessment. The plant should have at least eight nodes, since flecking in some varieties may not be expressed at lower nodes.

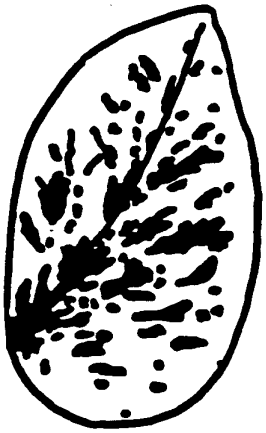


1
very sparse

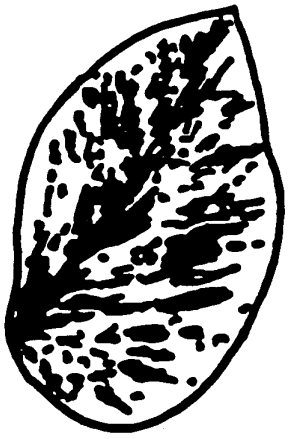


3
sparse

5
medium



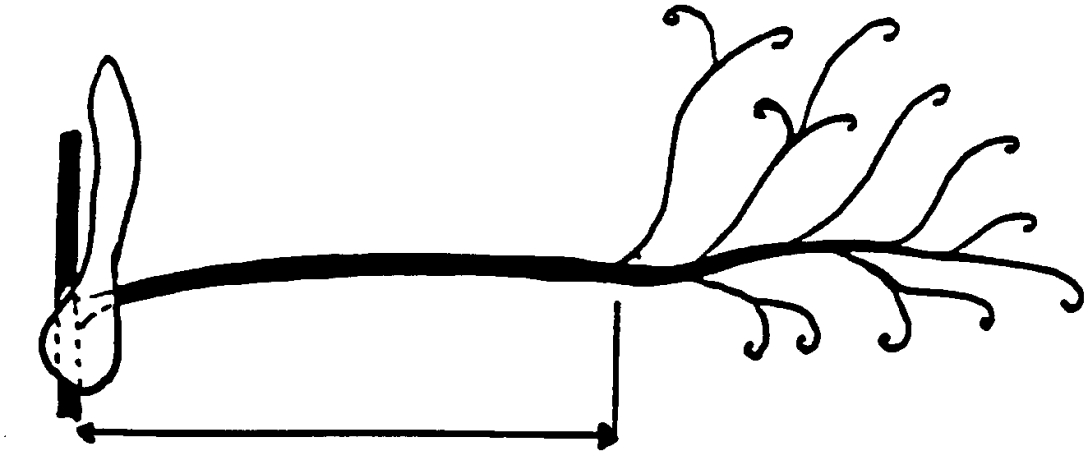
7
dense



9
very dense

Ad 35 D: Varieties without leaflet only: Petiole: length (from axil to the first tendril)

The observation should be made at the second fertile node. The length should be recorded from the axil to the point where the first tendril occurs.



Ad 36: Time of flowering

The observations should be made when approximately 30% of the plants have one flower open.

Ad 37: Non-fasciated varieties only: Plant: maximum number of flowers per node

The maximum number of flowers per node should be calculated as a mean of a recorded sample. The observations should be made when highest nodes produce flower buds which do not open. With cooler conditions, strings of suture will appear later than normal.

Ad 41: Flower: colour of standard

The colour of standard should be recorded on flowers which are fully opened and fresh.

Ad 42: Flower: maximum width of standard

The standard should be detached from the flower and flattened on a hard surface. The observation should be made at the widest point.

Ad 43: Flower: shape of base of standard

1	3	5	7	9
strongly raised	raised	level	arched	strongly arched

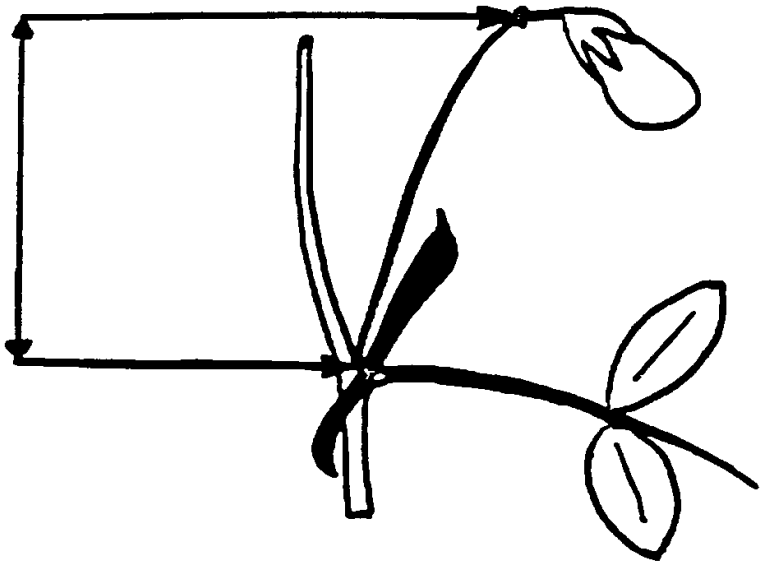
The standard should be detached and flattened on a hard surface.

Ad 44: Flower: intensity of undulation of standard

The maximum expression on the plant should be recorded. It should be ensured that flowers recorded are fully opened and not senescing.

Ad 47: Flower: length of peduncle from stem to first flower

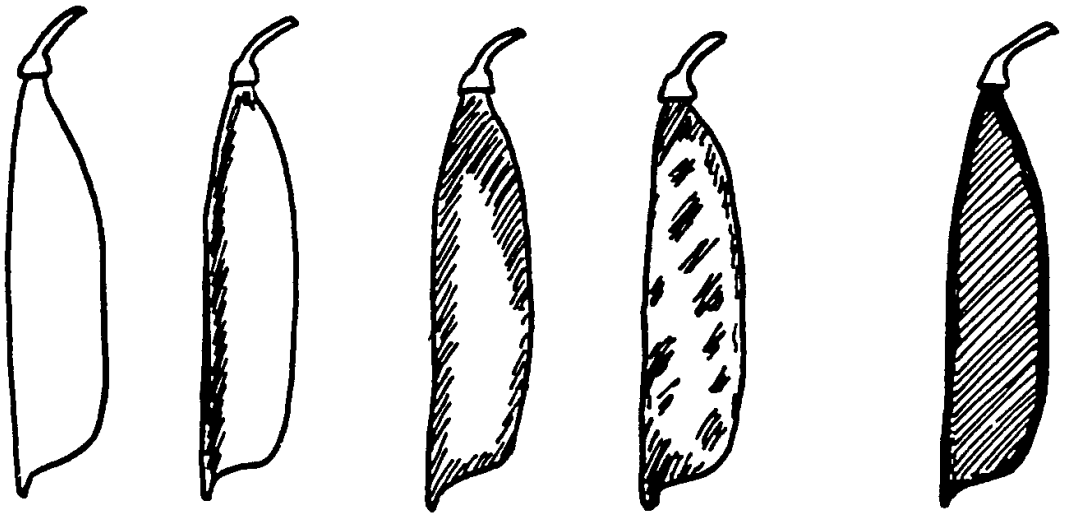
The observations should be made at the first flowering node. Measurements should be taken from the axil to the first node or bend in the peduncle.



Ad 49: Pod: maximum width

The observations should be taken from suture to suture on unopened pods.

Ad 50: Pod: parchment



1 2 3

/----------/

absent (pv) | partially present (pV) | entirely present (pv)

(1) With the exception of Snap Peas which have thickened walls, the observations should be made on dry pods. Snap Peas are best recorded when green, in order to minimise fungal infection which can obscure assessment.

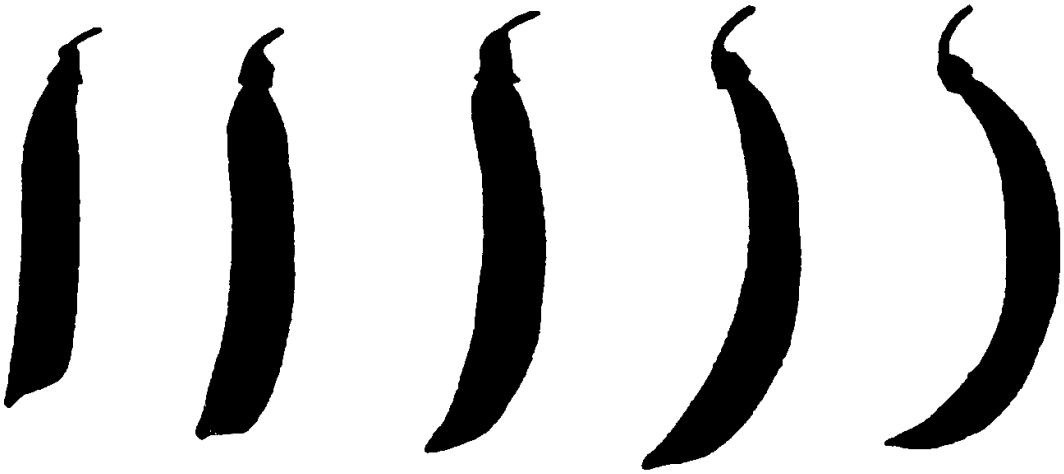
(2) The pod should be opened along the suture without damaging the edges of the two valves. The distribution of sclerenchyma, which makes up the parchment, may either be observed by staining with Phoroglucinol in Hydrochloric Acid, or by reflecting light (preferably daylight) on the inside of the pod wall.

Ad 51: Pod: thickened wall

The observations should be made only on varieties with no or partial parchment although thickened pod walls can also occur in fully parchmented types. They should be made on well developed pods not showing any signs of senescence.

Ad 52: Pod: degree of curvature

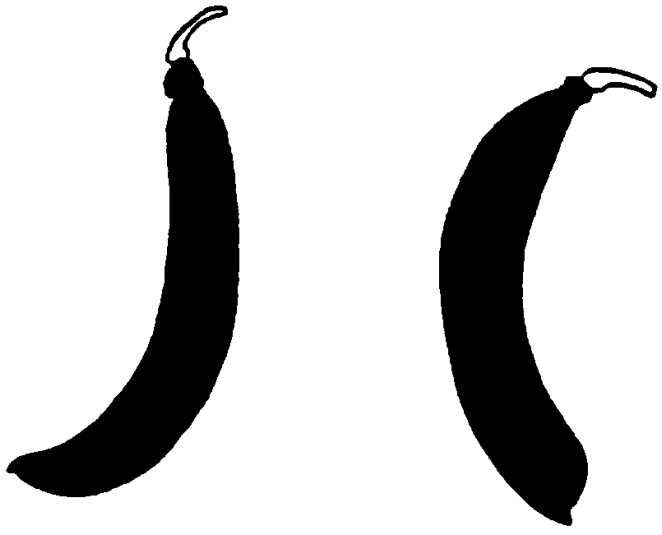
The observations should be made on the fully developed green pod. The maximum expression over the whole plant should be assessed.



1	3	5	7	9
absent or very weak	weak	medium	strong	very strong

Ad 53: Pod: type of curvature

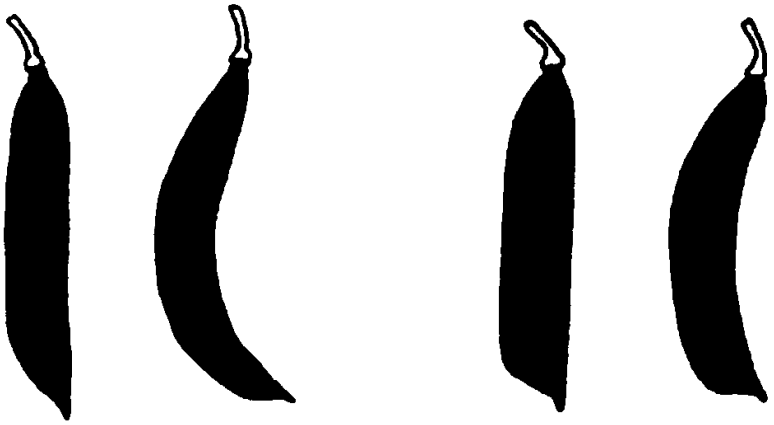
The maximum expression over the whole plant should be assessed



1	2
concave	convex

Ad 54: Pod: shape of distal part

The observations should be made only on varieties without thickened pod wall D: as the assessment of pod tip shape is unreliable where a thickened wall is present. They should be made on a sample of plants and on several nodes of each plant when pods are fully developed, but before any senescence.



1
pointed

2
blunt

Ad 56 + 61: Pod: intensity of green colour (56) and colour of immature seed (61)

The observations should be made at a stage when the seed is firm, but before seeds become starchy to taste. Pods should show no sign of senescence or drying out.

Ad 57: Pod: strings of suture

The observations should be made on fully developed pods. If assessed when pods are not fully developed, strings of suture will be absent or partial. The expression is best observed when temperatures exceed 20 degrees Centigrade.

Ad 58 Pod: anthocyanin coloration of suture

The observations should be made over the whole plant when pods are well developed and are beginning to dry out.

Ad 59: Pod: spots of anthocyanin coloration on outer wall

The observations should be made over the whole plant when pods are well developed and are beginning to dry out. If present, several fine spots of anthocyanin appear on the pod wall – often in an area around, or on top of, the underlying seed.

Ad 60: Pod: number of ovules

The observations should be made at the second fertile node preferably when seeds are partially developed, but before the occurrence of senescence.

Ad 62: Seed: time of maturity

The seed should be hard and dry for accurate assessment.

Ad 63: Dry seed: wrinkling of cotyledon

'Golf ball' and large dimples should be ignored as these can also be found on smooth seeded (non-wrinkled types). Cylindrically shaped seed types should be assessed carefully, because some are smooth seeded.

Ad 65: Seed: weight

The observations should be made on two samples of 100 harvested seeds. Immature and infected seeds should be excluded; the seed should be dry (approximately 10-15% moisture content) at time of recording.

Ad 66 – 72: Characteristics on Disease Resistance

It is recommended that disease resistance tests for the following characteristics make use of a standard set of host differentials which are available from the John Innes Institute, with a back-up set in Edinburgh:

John Innes Centre	Scottish Agricultural Science Agency
Pea Gene Bank	U.K. Pisum Cultivar Collection
Colney Lane	East Craigs, Craigs Road
Norwich	Edinburgh
NR4 7UH	EH12 8NJ
United Kingdom	United Kingdom

HOST DIFFERENTIALS FOR CHARACTERISTICS IN THE UPOV TEST GUIDELINES

Host Differential Line	Source	Char	Disease	Race	Susceptible/ resistant
JI 1365 Little Marvel		66.1	Fusarium oxysporum f.sp. pisi	Race 1	Susceptible
JI 1362 Dark Skin Perfection		66.1	Fusarium oxysporum f.sp. pisi	Race 1	Resistant
JI 1363 WSU 28		66.2	Fusarium oxysporum f.sp. pisi	Race 2	Susceptible
JI 1364 WSU 23		66.2	Fusarium oxysporum f.sp. pisi	Race 2	Resistant
JI 1365 Little Marvel		66.3	Fusarium oxysporum f.sp. pisi	Race 5	Susceptible
JI 1364 WSU 23		66.3	Fusarium oxysporum f.sp. pisi	Race 5	Resistant
JI 1365 Little Marvel		66.4	Fusarium oxysporum f.sp. pisi	Race 6	Susceptible
JI 1363 WSU 28		66.4	Fusarium oxysporum f.sp. pisi	Race 6	Resistant
JI 502 Rondo		67	Erisyphe pisi Syd.	-	Susceptible
JI 1559 Mexique 4		67	Erisyphe pisi Syd.	-	Resistant
JI 394 Kelvedon Wonder		68	Ascochyta pisi Lib	Race C	Susceptible
JI 502 Rondo		68	Ascochyta pisi Lib	Race C	Resistant
JI 2430 Kelvedon Wonder		69.1	Pseudomonas syringae pv. pisi	Pathovar 2	Susceptible
JI 2431 Early Onward		69.1	Pseudomonas syringae pv. pisi	Pathovar 2	Resistant
JI 2431 Early Onward		69.2	Pseudomonas syringae pv. pisi	Pathovar 4	Susceptible
JI 2439 Fortune		69.2	Pseudomonas syringae pv. pisi	Pathovar 4	Resistant
JI 363 Lincoln		70	Seed-borne Mosaic Virus	Strain P1	Susceptible
JI 968 WBH 1779 / PI 193835		70	Seed-borne Mosaic Virus	Strain P1	Resistant
JI 502 Rondo		71	Bean Yellow Mosaic Virus	-	Susceptible
JI 394 Kelvedon Wonder		71	Bean Yellow Mosaic Virus	-	Resistant
- Dark Skin Perfection		72	Pea Enation Mosaic Virus	-	Susceptible
- Perfected Freezer 60		72	Pea Enation Mosaic Virus	-	Resistant

It should be emphasized that host differentials are pure lines and are more reliable than commercial varieties of the same name, since the latter may not have sufficiently uniform resistance or susceptibility to carry out accurate tests.

It is also recommended that isolates are obtained from the sources listed under each characteristic, so that the risks of differences arising due to multiple maintenance are reduced.

Ad 66: Resistance to Fusarium oxysporum f. sp. pisi

Host Differentials used for test:

Race 1: Line JI 1365 ex cv. Little Marvel (Susceptible)
Line JI 1362 ex cv. Dark Skin Perfection (Resistant)

Race 2: Line JI 1363 ex WSU 28 (Susceptible)
Line JI 1364 ex WSU 23 (Resistant)

Race 5: Line JI 1365 ex cv. Little Marvel (Susceptible)
Line JI 1364 ex WSU 23 (Resistant)

Race 6: Line JI 1365 ex cv. Little Marvel (Susceptible)
Line JI 1363 ex WSU 28 (Resistant)

Isolates and isolate identity

Isolate identity is determined by testing against the host differential set described by Haglund and Kraft (1979). All isolates are derived from single spore cultures.

Isolates used in the test: Race 1: IPO culture collection No. 20379
Race 2: WSU culture type 2
Race 5: IPO culture collection No. 10279
Race 6: WSU culture type 6.

Maintenance of isolates

Maintained in refrigerator at 4°C as a soil culture (loam). Passage through a susceptible variety every 2-3 years. Isolate identity is determined by testing against a host differential set.
Maintenance of isolates for:

Races 1 and 5:	Races 2 and 6:
Institute for Plant Protection (IPO) Binnenhave 12, P.O. Box 9060 6700 GW Wageningen The Netherlands	Washington State University Research and Extension Unit Mount Vernon, Washington 98273 United States of America

Preparation of inoculum

Cultures of the fungus are grown in liquid Czapek-Dox medium at 24°C in daylight conditions for 7 days. The liquid is continuously aerated by sterile air. The cultures are strained through muslin followed by centrifugation at 3,500 rpm for 10 minutes; the solution is diluted with distilled water to a concentration of 106 spores/ml.

Composition of the Czapek-Dox liquid medium

2.0 g Sodium Nitrate
0.5 g Potassium Chloride
1.0 g Dipotassium Phosphate
0.5 g Magnesium Sulphate
0.01 g Ferrous Sulphate
30.0 g Saccharose

The above mixture is added to 1 litre of distilled water and poured into a flask; the solution is sterilized in an autoclave at 115°C for 20 minutes.

Inoculation and assessment of disease

Test plants and controls are raised in 1:1 peat and sand mixture and adjusted to pH 5.0. 1 litre of spore suspension is used. Two replicates of 10 plants are grown for assessment: a third replicate is grown if any problems arise. After 3 weeks, or 4-5 node stage, the basal third of the seedling roots can be cut and dipped into the inoculum for 3-5 seconds before being transplanted. Four weeks after inoculation, surviving seedlings are recorded as resistant.

Ad 67: Resistance to Erysiphe pisi Syd.

Host Differentials used for test

Line JI 502 ex cv. Rondo (Susceptible)
Line JI 1559 ex Mexique 4 (Resistant)

Maintenance of isolates

It is not necessary to maintain isolates; infection occurs from natural sources.

Assessment of disease

Infected foliage surfaces are white and powdery. Tissue beneath the infected areas may turn purplish followed by the production of black fruiting structures. Badly infected tissue remains soft and fails to dry out naturally. In resistant plants, infection is absent or localized in very small patches.

Ad 68: Resistance to Ascochyta pisi, Race C

Host Differentials used for test

Line JI 394 ex cv. Kelvedon Wonder (Susceptible)
Line JI 502 ex cv. Rondo (Resistant)

Isolates and isolate identity

Isolate is used in the test: Tezier Strain
Isolate identity is determined by testing against a host differential set.

Maintenance of isolates

Maintained on Mathur medium at ambient temperature. Isolate identity is determined by testing against a host differential set.
Isolates are maintained at:

INRA
Station de Génétique et d'Amélioration des Plantes
Etoile de Choisy, Route de Saint-Cyr
78026 VERSAILLES CEDEX
France

Preparation of inoculum

Add 0.4% Tween 80 wetting agent to aid dispersal of spores. Remove hyphal fragments by straining solution through muslin. Concentration of 106 spores/ml.

Inoculation and assessment of disease

Grow seedlings in glasshouse under natural day length at 20°C and high humidity. Two replicates of 10 plants are grown; a third replicate is grown if any problems arise. Spray inoculum on young seedlings 10-15 days after emergence; mist spray 2 or 3 times per day for 15 minutes. Alternatively, inoculation can be made at the apex of enrolled leaves. This method does not require conditions of high humidity. Plants are assessed about 5 days after inoculation. Infection is very clear when present: necrotic lesions are slightly sunken, brown and sharply delineated. Lesions are circular on pods and elongated on stems.

Ad 69: Resistance to Pseudomonas syringae pv. pisi

Host Differentials used for test

Pathovar 2: Line JI 2430 ex cv. Kelvedon Wonder (Susceptible)
Line JI 2431 ex cv. Early Onward (Resistant)

Pathovar 4: Line JI 2431 ex cv. Early Onward (Susceptible)
Line JI 2439 ex cv. Forture (Resistant)

Since the method for testing all pathovars is the same, the following Host Differentials are available:

HOST DIFFERENTIAL PATHOVARS: 1 2 3 4 5 6 7

Line JI 2430 ex cv. Kelvedon Wonder	S S S S S S S
Line JI 2431 ex cv. Early Onward	S R S S R S R
Line JI 2432 ex cv. Belinda	R S R S S S R
Line JI 2435 ex cv. Hurst Greenshaft	R S S R R S R
Line JI 2436 ex cv. Vinco	R R R S R S R
Line JI 2437 ex cv. Sleaford Triumph	R R S R R S R
Line JI 2438 ex cv. Partridge	R S R R R S R
Line JI 2439 ex cv. Fortune	R R R R R S R

Isolates and isolate identity

The following isolates are used for testing:

Pathovar 1:	299A
Pathovar 2:	202
Pathovar 3:	870A
Pathovar 4:	895A
Pathovar 5:	974B
Pathovar 6:	1704B
Pathovar 7:	2491A

Isolate identity is determined by serological reactions (Taylor 1972; Taylor and Dye 1972) and by their pathogenicity to one or more host differential varieties.

Maintenance of isolates

Bacteria are stored either as lyophilized cultures in sealed vials at ambient temperature or as frozen suspensions at -80°C. Isolate identity is determined by serological reactions and by their pathogenicity to one or more host differentials.
Isolates are maintained at:

Horticultural Research International
Wellesbourne
Warwick
CV35 9EF
United Kingdom

Preparation of inoculum

Bacteria are grown on plates of King's Medium B for 24-48 hours at 25°C. Bacteria are scraped from the culture surface for inoculation.

Inoculation and assessment of disease

Two replicates of 10 plants are inoculated for each pathovar; a third replicate is grown if any problems arise. 10-14 day old seedlings, grown under glass at 20°C, are inoculated into young growing tissue of the stem at the axil with the stipule. The tip of a sterilized entomological mounting pin is scraped along the culture surface and stabbed into the plants at the two youngest nodes (2 inoculations per plant). Plant reactions are recorded 5-10 days after inoculation as either resistant or susceptible. Susceptible response is expressed as water soaked tissue around the point of inoculation; resistant response is expressed as a localized necrotic reaction.

Ad 70: Resistance to Seed-borne Mosaic Virus (SbmV), Strain P1

Host Differentials used for test

Strain P1: Line JI 363 ex Lincoln (Susceptible)
Line JI 968 ex WBH 1779 = PI 193835 (Resistant)

Isolates and isolate identity

Isolates used in the test: PSbm P1 Versailles Strain.
Isolate identity is determined by reaction to antiserum in serological tests and by reaction with a set of Host Differential varieties.

Maintenance of isolates

Symptomatic leaves or shoot tissue of infected seedlings are used to prepare inoculum, and are stored dry at -18°C. Isolate identity is determined by reaction to antiserum in serological tests and by reaction with a set of host differentials.
Isolates are maintained at:

INRA
Station de Génétique et d'Amélioration des Plantes
Etoile de Choisy, Route de Saint-Cyr
78026 VERSAILLES CEDEX
France

Preparation of inoculum

Infected dry plant tissue is ground in a phosphate buffer (pH 8.5, 0.005M).

Inoculation and assessment of disease

Two replicates of 10 plants are grown; a third replicate is grown if any problems arise. Inoculum is applied after a dark period (early morning), to carborundum powder dusted leaves of 10-14 day old seedlings. Inoculated plants are maintained at 24°C and 14,000 Lux. Care is taken to avoid too much damage of the tissue to prevent necrosis. Susceptible plants are stunted and have rolling of the leaf margins, with or without leaf mosaic. The presence of infection in the plant is detected by ELISA test.

Ad 71: Resistance to Bean Yellow Mosaic Virus (BYMV)

Host Differentials used for the test

Line JI 502 ex Rondo (Susceptible)
Line JI 394 ex Kelvedon Wonder (Resistant)

Isolates

Isolate used in the test: Versailles Strain.

Maintenance of isolates

Isolates are stored as infected dry tissue at +5°C or infected tissue at -18°C.
Isolates are maintained at:

INRA
Station de Génétique et d'Amélioration des Plantes
Etoile de Choisy, Route de Saint-Cyr
78026 VERSAILLES CEDEX
France

Preparation of inoculum

Infected dry tissue is ground in a phosphate buffer (pH 8.5, 0.005M).

Inoculation and assessment of disease

Two replicates of 10 plants are grown; a third replicate is grown if any problems arise. Plants are grown under glass at 20°C and supplementary lighting to provide a 14-16 hour daylength (supplementary illumination 500 Watts/m^2). At the 2-3 leaf stage, the isolate is added to the plant following abrasion with carborundum powder. Ten days after the inoculation, whether or not symptoms exist, presence/absence of the disease is assessed.

Ad 72: Resistance to Pea Enation Mosaic Virus (PEMV)

Host Differentials used for test

Dark Skinned Perfection (Susceptible)
Perfected Freezer 60 (Resistant)

Isolates

Lyophilized infected tissue is stored at -20°C. The virus remains viable for more than 5 years under these storage conditions. Isolate PEM-3 is readily mechanically transmissible, is stable during long-term maintenance (i.e. has not produced variants) and is representative of PEMV occurring naturally in North America and Europe (i.e. glasshouse inoculations produce results agreeing with those obtained by natural field inoculations). Isolates of PEMV tend to be monotypic; thus similar results should be possible with other isolates from North America or Europe.

Maintenance of isolates

Symptomatic leaves or shoot tissue of infected seedlings are used to prepare inoculum; lyophilized infected tissue is stored at -20°C.
Isolate (and other reference isolates) are maintained at:

USDA ARS
Department of Botany Plant Pathology
Oregon State University
Corvallis
Oregon 97331-2902
United States of America

Preparation of inoculum

Grind dessicated infected tissue (1:50, g/cm3) in a phosphate buffer (pH 8.5, 0.005M) and allow to re-hydrate for 5 minutes before grinding again.

Inoculation and assessment of disease

The crude extract is applied to carborundum-dusted young leaves. Apply inoculum to first fully-expanded true leaves, lightly dusted with 400-mesh carborundum. Maintain inoculated plants at 20-25°C and 11,000 Lux. (Use of plants after 2-3 leaf stage produces unreliable results) Symptoms consisting of stunting, mosaic, and leaf-shape deformity typically develop 10 to 15 days after inoculation. Non-inoculated control plants are essential for establishing the effects of viral inoculation. For homozygous lines, 20 to 50 inoculated seedlings should accurately determine resistance or susceptibility of genotype.

KEY FOR THE GROWTH STAGES

Key	General Description
0	Germination
00	Dry seed
10	Seedling growth
16	Young seedling with first scale leaf developed
18	Young seedling with second scale leaf developed
20	First pair of stipules at the third node fully opened
22	Stipules at the fourth node fully opened
25	Stipules at the fifth node fully opened
28	Stipules at the sixth node fully opened
30	Vegetative growth
31	Stipules at the seventh node fully opened
34	Stipules at the eighth node fully opened
40	Stipules at the tenth node fully opened
x	Stipules at the Nth node fully opened
200	Reproductive stage
200	Initiation of first flower
206	Development of first flower bud enclosed in stipules
208	Development and sometimes elongation of peduncle
210	Emergence of first flower bud from stipules
212	Emergence of standards from the calyx
214	Opening of the standards and emergence of the wings
216	Slight opening of the wings to show the keel
218	Standards usually fully opened
220	Standards beginning to crumple at the margins
222	Standards and wings showing signs of withering
224	Emergence of the first flat pod
226	Elongation of the flat pod with clearly visible ovules
230	Swelling of the ovules and slight swelling of the pod wall
235	Green seed rounded becoming slightly firm; pods almost fully swollen or developed
240	Green seed firm, becoming starchy; pods fully developed or swollen
245	Green seed becoming pale, testas tough; pod beginning to lose colour
250	Stem and lower foliage becoming yellowish

Key	General Description
255	Seed drying and becoming yellowish green; pod becoming wrinkled
260	Lower foliage becoming dry at margins
265	Seed yellowish green; pods wrinkled, pale green
270	Lower foliage becoming dry and papery
275	Seed yellowish-white and rubbery; pods wrinkled and yellowish-green
280	Stem drying out, becoming yellowish-green
285	Lowest pods yellowish-brown, dry and papery
290	Stem becoming stiff and brittle and appearing yellowish-white
300	Lower and middle nodes with dry papery foliage; lower pods dry and papery
305	All nodes with dry papery foliage; lower and middle pods dry and papery
310	All nodes with dry papery foliage and pods; seed drying but not hard
320	Hard dry seed

ANNEX II

European Union
Community Plant Variety Office

TECHNICAL QUESTIONNAIRE

to be completed in connection with an application for Community Plant Variety Rights
Please answer all questions. A question without any answer will lead to a non-attribution of an application date. In cases where a field / question is not applicable, please state so.

1. **Botanical taxon:** Name of the genus, species or sub-species to which the variety belongs and common name

***Pisum sativum* L. sensu lato**

PEAS

2. **Applicant(s):** Name(s) and address(es), phone and fax number(s), Email address, and where appropriate name and address of the procedural representative

3. **Variety denomination**

a) Where appropriate proposal for a variety denomination:

b) Provisional designation (breeder's reference):

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

4.1 Origin

(a) Seedling (indicate parent varieties)..... [ ]

(b) Mutation (indicate parent variety) ..... [ ]

(c) Discovery (indicate where, when and how the variety has been developed):..... [ ]

(d) Other (please specify)..... [ ]

4.2 Method of propagation

(a) Cuttings..... [ ]

(b) *In vitro* propagation ..... [ ]

(c) Seed ..... [ ]

(d) Other (please specify): ..... [ ]

4.3 Other information:

In the case of seed propagated varieties: method of production:

(a) Self-pollinated ..... [ ]

(b) Cross-pollinated (please give details) ..... [ ]

(c) Hybrid (please give details) ..... [ ]

4.4 Geographical origin of the variety: the region and the country in which the variety was bred or discovered and developed

4.5 Shall the information on data relating to components of hybrid varieties including data related to their cultivation be treated as confidential?

[ ] YES [ ] NO

If yes, please give this information on the attached form for confidential information.

If no, please give information on data relating to components of hybrid varieties including data related to their cultivation:

Breeding scheme (indicate female component first)

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in the CPVO Protocol; please mark the state of expression which best corresponds).

Characteristics		Example varieties	Note
5.1 (2)	**Seed: shape of starch grain**		
	simple	Maro, Solara, Zorba	1 [ ]
	compound	Avola, Polar	2 [ ]
5.2 (3)	**Seed : colour of cotyledon**		
	green	Avola, Solara	1 [ ]
	yellow	Birte, Nadja	2 [ ]
5.3 (4)	**Varieties with anthocyanin only: Seed: marbling of testa**		
	absent	Nadja	1 [ ]
	present	Tombola	9 [ ]
5.4 (5)	**Varieties with anthocyanin only: Seed: violet or pink spots on testa**		
	absent	Nadja, Tombola	1 [ ]
	faint	Assas, Susan	2 [ ]
	intense	Arvika, Livia	3 [ ]
5.5 (6)	**Seed: black colour of hilum**		
	absent	Avola, Nadja	1 [ ]
	present	Nofila, Poneka	9 [ ]
5.6 (9)	**Plant: anthocyanin coloration**		
	absent	Avola, Solara	1 [ ]
	present	Nadja, Poneka	9 [ ]

Characteristics		Example varieties	Note
5.7 (65)	**Seed: weight**		
	very small	Douroy	1 [ ]
	small	Cherger, Livia	3 [ ]
	medium	Bondi, Edula	5 [ ]
	large	Maro, Tombola	7 [ ]
	very large	Imposant	9 [ ]
5.8 (62)	**Seed: time of maturity**		
	very early		1 [ ]
	early	Belinda, Bodil	3 [ ]
	medium	Finale, Livia	5 [ ]
	late	Minor	7 [ ]
	very late	NFG Krupp Peluschke	9 [ ]
5.9 (16)	**Foliage: colour**		
	yellow green	Pilot	1 [ ]
	green	Avola, Nadja	2 [ ]
	blue green	Polar	3 [ ]
5.10 (19)	**Leaf: leaflets**		
	absent	Rampart, Solara	1 [ ]
	present	Avola, Nadja	9 [ ]
5.11 (28)	**Stipule: type of development**		
	rudimentary	Filby	1 [ ]
	well developed	Avola, Progreta, Solara	2 [ ]
5.12 (29)	**Stipule: 'rabbit-eared' stipules**		
	absent	Birte, Nadja	1 [ ]
	present	Progreta	9 [ ]

Characteristics		Example varieties	Note
5.13 (33)	**Stipule: flecking**		
	absent	Lisa, Orfac	1 [ ]
	present	Avola, Maro	9 [ ]
5.14 (36)	**Time of flowering**		
	very early	Orfac	1 [ ]
	early	Span, Sprite	3 [ ]
	medium	Finale, Waverex	5 [ ]
	late	Atlas, Poneka	7 [ ]
	very late	Regina	9 [ ]
5.15 (38)	**<u>Varieties with anthocyanin only</u>: Flower: anthocyanin coloration of wing**		
	pink blush	Golf	1 [ ]
	pink	Rosakrone	2 [ ]
	reddish purple	Assas	3 [ ]
5.16 (48)	**Pod: length (at second flowering node)**		
	very short	NFG Krupp Peluschke, Waverex	1 [ ]
	short	Driad, Solara	3 [ ]
	medium	Atlas, Jof	5 [ ]
	long	Hurst Green Schaft, Protor	7 [ ]
	very long	Roi de Carouby	9 [ ]
5.17 (50)	**Pod: parchment**		
	absent	Orlex, Sugar Gem	1 [ ]
	partially present		2 [ ]
	entirely present	Avola, Solara	3 [ ]
5.18 (51)	**<u>Varieties with no or partial parchment only:</u> Pod: thickened wall**		
	absent	Nofila, Reuzensuiker	1 [ ]
	present	Edula, Sugar Snap	9 [ ]

Characteristics		Example varieties	Note
5.19 (54)	**<u>Varieties without thickened wall only</u>: Pod:shape of distal part**		
	pointed	Jof, Orfac	1 [ ]
	blunt	Avola, Solara	2 [ ]
5.20 (55)	**Pod: colour**		
	yellow	Orlex	1 [ ]
	green	Avola, Solara	2 [ ]
	blue-green	Miracle, Miragreen	3 [ ]
	purple	Blauwschokker	4 [ ]
5.21 (61)	**Pod: intensity of green colour of immature seed**		
	light	Perfection, Solara	3 [ ]
	medium		5 [ ]
	dark	Dark Skin Perfection, Kasino	7 [ ]

6. Similar varieties and differences from these varieties:

Denomination of similar variety	Characteristic in which the similar variety is different[1)]	State of expression of similar variety	State of expression of candidate variety

[1)] 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

	absent	present	not tested
i) *Fusarium oxisporum* f. sp. Pisi			
Race 1 (Characteristic 66.1)	[ ]	[ ]	[ ]
Race 2 (Characteristic 66.2)	[ ]	[ ]	[ ]
Race 5 (Characteristic 66.3)	[ ]	[ ]	[ ]
Race 6 (Characteristic 66.4)	[ ]	[ ]	[ ]
ii) *Erysiphe pisi* Syd. (Characteristic 67)	[ ]	[ ]	[ ]
iii) *Ascochyta pisi*,			
Race C (Characteristic 68)	[ ]	[ ]	[ ]
iv) *Pseudomonas syringae* pv. Pisi			
Pathovar 2 (Characteristic 69.1)	[ ]	[ ]	[ ]
Pathovar 4 (Characteristic 69.2)	[ ]	[ ]	[ ]
v) Seed-borne Mosaic Virus (SbmV) Strain P1 Characteristic 70	[ ]	[ ]	[ ]
vi) Bean Yellow Mosaic Virus (BYMV) Characteristic 71	[ ]	[ ]	[ ]
vii) Pea Enation Mosaic Virus (PEMV) Characteristic 72	[ ]	[ ]	[ ]
viii) Other resistances (specify)	[ ]	[ ]	[ ]

7.2 Main use

i) Agricultural crop [ ]
- grain [ ]
- forage [ ]

ii) Vegetable [ ]
- canning [ ]
- freezing [ ]
- fresh market or garden [ ]
- drying [ ]
- edible pods [ ]

iii) Other conditions [ ]

7.3 Growth type

- dwarf [ ]
- non dwarf [ ]

7.4 Special conditions for the examination of the variety

[ ] YES, please specify

[ ] NO

7.5 Other information

[ ] YES, please specify

[ ] NO

8. GMO-information required

The variety represents a Genetically Modified Organism within the meaning of Article 2(2) of Council Directive EC/2001/18 of 12/03/2001.

[ ] YES [ ] NO

If yes, please add a copy of the written attestation of the responsible authorities stating that a technical examination of the variety under Articles 55 and 56 of the Basic Regulation does not pose risks to the environment according to the norms of the above-mentioned Directive.

I/we hereby declare that to the best of my/our knowledge the information given in this form is complete and correct.

Date Signature Name

[End of document]