



European Union
Community Plant Variety Office

PROTOCOL FOR DISTINCTNESS, UNIFORMITY AND STABILITY TESTS

Malus domestica Borkh.

APPLE

UPOV Species Code: MALUS_DOM

Adopted on 14/03/2006

I SUBJECT OF THE PROTOCOL

The protocol describes the technical procedures to be followed in order to meet the 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/14/9 dated 06/04/2005 for the conduct of tests for Distinctness, Uniformity and Stability. This protocol applies to fruit varieties of *Malus domestica* Borkh..

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 as the definitive sample of the candidate variety.

The applicant is responsible for ensuring compliance with any customs and plant health requirements including the presentation of an appropriate phytosanitary certificate.

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 whether acceptable plant material has been received or not. However if unsatisfactory plant material is submitted the CPVO should be informed as soon as possible.

3. Plant material requirements

The current quality and quantity requirements as well as the final dates for submission of the plant material are available on the CPVO website (www.cpvo.europa.eu) and are published in the CPVO gazette 'S2'.

Quality of plants: Should not be less than the standards laid down in Council Directive 77/93/EEC and 2000/29/EC and their amendments concerning quarantine organisms, and Council Directive 92/34/EEC and Commission Directive 93/48/EEC and their amendments concerning organisms impairing quality, at the date of adoption of this protocol; please refer to "Eur-Lex" for the full text and in case of any subsequent amendments to the three aforesaid Directives.

Quarantine organism (Directive 77/93/EEC and 2000/29/EC). The plant material must be free from:

Insects, mites and nematodes at all stages of their development

- *Acleris* spp. (non-European)
- *Amauromyza maculosa*
- *Anomala orientalis*
- *Anoplophora chinensis*
- *Anoplophora malasiaca*
- *Arrhenodes minutus*
- *Bemisia tabaci* (non-European populations)
- *Carposina niponensis*
- *Choristoneura* spp. (non-European)
- *Cicadellidae* (non-European)
- *Conotrachelus nenuphar*
- *Enarmonia prunivora*
- *Enarmonia packardi*
- *Globodera pallida*
- *Globodera rostochiensis*
- *Grapholita inopinata*
- *Heliothis armigera*
- *Heliothis zea*
- *Liriomyza bryoniae*
- *Liriomyza huidobrensis*
- *Liriomyza trifolii*
- *Liriomyza sativae*
- *Longidorus diadecturus*
- *Monochamus* spp. (non-European)
- *Myndus crudus*
- *Nacobbus aberrans*
- *Opogona sacchari*
- *Popilia japonica*
- *Premnotrypes* spp. (non-European)

- *Pseudopityophthorus minutissimus*
- *Pseudopityophthorus pruinus*
- *Scaphoideus luteolus*
- *Spodoptera eridania*
- *Spodoptera frugiperda*
- *Spodoptera littoralis*
- *Spodoptera litura*
- *Tephritidae* (non-European)
- *Trachypterellus quadrigibbus*
- *Thrips palmi*
- *Xiphinema americanum* (non-European populations)
- *Xiphinema californicum*

Bacteria

- *Clavibacter michiganensis*
- *Erwinia amylovora*
- *Pseudomonas solanacearum*
- *Xylella fastidiosa*

Fungi

- *Alternaria alternata*
- *Ceratocystis fagacearum*
- *Chrysomya arctostaphyli*
- *Cronartium* spp. (non-European)
- *Endocronartium* spp. (non-European)
- *Guignardia loricata*
- *Guignardia piricola*
- *Gymnosporangium* spp. (non-European)
- *Inonotus weirii*
- *Melampsora medusae*
- *Melampsora farlowii*
- *Monilinia fructicola*
- *Mycosphaerella larici-leptolepis*
- *Mycosphaerella populorum*
- *Phoma andina*
- *Phyllosticta solitaria*
- *Septoria lycopersici*
- *Synchytrium endobioticum*
- *Thecaphora solani*
- *Trechispora brinkmannii*

Viruses and virus-like organisms

1. Elm phloem mycoplasma
2. Potato viruses and virus-like organisms such as:
 - Andean potato latent virus
 - Andean potato mottle virus
 - Arracha virus B, oca strain
 - Potato black ringspot virus
 - Potato spindle tuber viroid
 - Potato virus T

- Non-European isolates of potato viruses A, M, S, V, X and Y (including Yo, Yn and Yc) and Potato leafroll virus
- 3. Tobacco ringspot virus
- 4. Tomato ringspot virus
- 5. Viruses and virus-like organisms of *Cydonia* Mill., *Fragaria* L., *Malus* Mill., *Prunus* L., *Pyrus* L., *Ribes* L., *Rubus* L., and *Vitis* L., such as:
 - Apple proliferation mycoplasma
 - Apricot chlorotic leafroll mycoplasma
 - Blueberry leaf mottle virus
 - Cherry rasp leaf mottle virus (American)
 - Peach mosaic virus (American)
 - Peach phony rickettsia
 - Peach rosette mosaic virus
 - Peach rosette mycoplasma
 - Peach-X disease mycoplasma
 - Peach yellows mycoplasma
 - Pear decline mycoplasma
 - Plum line pattern virus (American)
 - Raspberry leaf curl virus (American)
 - Strawberry latent "C" virus
 - Strawberry vein banding virus
 - Strawberry witches' broom mycoplasma
 - Non-European viruses and virus-like organisms of *Cydonia* Mill., *Fragaria* L., *Malus* Mill., *Prunus* L., *Pyrus* L., *Ribes* L., *Rubus* L., and *Vitis* L.,
- 6. Viruses transmitted by *Bemisia tabaci* Genn, such as:
 - Bean golden mosaic virus
 - Cowpea mild mottle virus
 - Lettuce infectious yellows virus
 - Pepper mild tigré virus
 - Squash leaf curl virus
 - Euphorbia mosaic virus
 - Florida tomato virus

Parasitic plants

- *Arceuthobium* spp. (non-European)

Organisms impairing quality (Directive 92/34/EEC and 93/48/EEC. The plant material must, at least on visual inspection, be substantially free from any harmful organisms and diseases impairing quality or any signs or symptoms thereof and in particular be free from:

Insects, mites and nematodes at all stages of their development

- *Anarsia lineatella*
- *Eriosoma lanigerum*
- Scale insects, in particular
Epidiaspis leperii, *Pseudaulacaspis pentagona*,
Quadraspidiotus perniciosus

Bacteria

- *Agrobacterium tumefaciens*
- *Pseudomonas syringae* pv. *syringae*

Fungi

- *Armillariella mellea*
- *Chondrostereum purpureum*
- *Nectria galligena*
- *Phytophthora cactorum*
- *Rosellinia necatrix*
- *Venturia* spp.
- *Verticillium* spp.

Viruses and virus-like organisms

- All (the plant material should at least be virus tested)

Chemical 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 individual plants in sample:

- Species
- File number of the application allocated by the CPVO
- Breeder's reference
- Examination office's reference (if known)
- Name of applicant
- The phrase "On request of the CPVO"

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 apple. 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 Annex 1. 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 expression 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 characters used for grouping could be the following:

- a) Tree: type (characteristic 2)
- b) Only varieties with ramified tree type: Tree: habit (characteristic 3)
- c) Fruit: general shape (characteristic 28)
- d) Fruit: relative area of over colour (characteristic 36)
- e) Fruit: hue of over colour – with bloom removed (characteristic 37)
- f) Fruit: pattern of over colour (characteristic 39)
- g) Time of beginning of flowering (characteristic 55)
- h) Time of eating maturity (characteristic 57)

5. Trial designs and growing conditions

The minimum duration of tests (independent growing cycles) will normally include at least two satisfactory crops of fruit. 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.

The test design is as follows

Each test should be designed to result in a total of, at least, 5 trees for varieties resulting from crossing and 10 trees from varieties obtained from mutations.

Varieties resulting from crossing: All observations should be made on 5 trees or parts taken from each of 5 trees. Unless otherwise indicated, all observations determined by measuring or counting should be made on a minimum of 2 parts taken from each of the 5 plants.

Varieties resulting from mutation: All observations should be made on 10 trees or parts taken from each of 10 trees. Unless otherwise indicated, all observations determined by measuring or counting should be made on a minimum of 1 part taken from each of the ten plants.

Observations of the tree type and habit should be made on bare trees in winter.

Observations on the one-year-old shoots should be made on lateral dormant shoots in winter on trees that have completed at least one growing season at the testing centre.

Observations on tree vigour, leaf blade and petiole should be made in summer when the tree is in peak vegetative growth. Observations on the leaf blade and petiole should be made on fully developed leaves from the middle third of vigorous current season shoots from the outside of the tree.

Observations on the flower should be made on the second or subsequent flowers, at the start of anther dehiscence.

Observations of the type of bearing and on the young fruit should be made 40 days after flowering.

Observations on the fruit should be made on 10 typical fruits taken from a minimum sample of 20 at the time of ripeness for eating. The terminal (king) fruits should be excluded.

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.

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
≤ 5	0
6-35	1

c) **Stability**

A candidate will be considered to be sufficiently stable when there is no evidence to indicate that it lacks uniformity.

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 fruiting periods but in some cases three fruiting 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 agreement, the applicant may be directly informed at the same time as the CPVO particularly if a visit to the trial is advisable.

The interim report as well as the final report shall be sent by the Examination Office to the CPVO.

ANNEXES TO FOLLOW

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ANNEX II

Technical Questionnaire

ANNEX I

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

CPVO N°	UPOV N°	Characteristics	Examples	Note	
1. (+) QN	1. (+) QN	Tree: vigour	very weak	Nield's Drooper	1
			weak	Akane	3
			medium	Golden Delicious	5
			strong	Bramley's Seedling	7
2. (+) QL	2. (*) QL	Tree: type	columnar	MacExcel, Wijcik	1
			ramified	Elstar, Golden Delicious	2
3. (+) QN	3. (*) QN	<u>Only varieties with ramified tree type: Tree: habit</u>	upright	Benoni, Gloster	1
			spreading	Bramley's Seedling, Jonagold	2
			drooping	Jonathan	3
			weeping	Neild's Drooper, Rome Beauty	4
4. (+) QN	4. (+) QN	Tree: type of bearing	on spurs only	Starkrimson Delicious	1
			on spurs and long shoots	Jonagold	2
			on long shoots only	Cortland, Rome Beauty	3
5. (+) QN	5. (+) QN	One-year-old shoot: thickness	thin	Laxton's Fortune, Remo	3
			medium	Jonagold	5
			thick	Bramley's Seedling	7
			very thick	Charlotte, Wijcik	9

CPVO N°	UPOV N°	Characteristics	Examples	Note	
6. (+) QN	6. (* (+) QN	One-year-old shoot: length of internode	very short	MacExcel, Wijcik	1
			short	Alkmene, Florina	3
			medium	Jonagold, Redaphough	5
			long	Auralia	7
7. PQ	7. PQ	One-year-old shoot: colour on sunny side	greenish brown	Granny Smith	1
			reddish brown	Vicking	2
			light brown	Arkcharm	3
			medium brown	Golden Delicious	4
			dark brown	Ingrid Marie	5
8. QN	8. QN	One-year-old shoot: pubescence (on distal half of shoot)	absent or very weak	Laxton's Fortune, Rewena	1
			weak	Golden Delicious	3
			medium	Cox's Orange Pippin	5
			strong	Bramley's Seedling	7
			very strong	Rambour d'Hiver	9
9. QN	9. (* QN	One-year-old shoot: number of lenticels	few	Alkmene, Bramley's Seedling	3
			medium	Cox's Orange Pippin	5
			many	Mutsu	7
10. (+) QN	10. (* (+) QN	Leaf blade: attitude in relation to shoot	upwards	Katja, Redsleeves	1
			outwards	Bramley's Seedling	2
			downwards	Granny Smith, Schone van Boskoop	3
11. QN	11. (* (+) QN	Leaf blade: length	very short	Reanda	1
			short	Court Pendu Plat	3
			medium	Florina	5
			long	Bramley's Seedling	7

CPVO N°	UPOV N°	Characteristics		Examples	Note		
12.	12.	Leaf blade: width	narrow	Cox's Orange Pippin	3		
			(*)	medium	Jonagold	5	
			QN	QN	broad	Bramley's Seedling	7
13.	13.	Leaf blade: ratio length/width	small	Bramley's Seedling	3		
			(*)	medium	Jonagold	5	
			QN	QN	large	Granny Smith	7
14.	14.	Leaf blade: intensity of green colour	light	Golden Delicious, Sansa	3		
			QN	QN	medium	James Grieve	5
				dark	Mutsu	7	
15. (+)	15. (+)	Leaf blade: incisions of margin (upper half)	crenate	Summerred	1		
			PQ	PQ	bicrenate	Alkmene, Jim Brian	2
				serrate type 1	Elstar, Gala	3	
				serrate type 2	Sirprize	4	
				biserrate	Freedom, Mutu, Schone van Boskoop	5	
16.	16.	Leaf blade: pubescence on lower side	absent or weak	Golden Delicious	1		
			QN	QN	medium	Cox's Orange Pippin, Elstar	2
				strong	James Grieve, Jonathan	3	
17.	17.	Petiole: length	short	Jonagold	3		
			(*)	medium	Granny Smith	5	
			QN	QN	long	Falstaff	7
18.	18.	Petiole: extent of anthocyanin coloration from base	small	Golden Delicious, Jonagold	3		
			QN	QN	medium	Cox's Orange Pippin, Gala	5
				large	Discovery, Richared Delicious	7	

CPVO N°	UPOV N°	Characteristics	Examples	Note			
19. (+)	19. (* (+)	Flower: predominant colour at balloon stage	white	Norhey	1		
			yellowish pink	Schöner aus Herrenhut, Worcester Pearmain	2		
			PQ	PQ	light pink	Gravensteiner, Jonathan	3
					dark pink	Elstar, Sylvia	4
					medium red	Kidd's Orange Red	5
					dark red	Weirouge	6
					purple	Rafzubin	7
20. QN	20. (* QN	Flower: diameter with petals pressed into horizontal position	very small	Freedom, Spätblühender Taffettapfel	1		
			small	Jonafree	3		
			medium	Cox's Orange Pippin	5		
			large	Schone van Boskoop	7		
21. (+)	21. (* (+)	Flower: arrangement of petals	free	Worcester Pearmain	1		
			intermediate	Golden Delicious, Jonagold, Topaz	2		
			QN	QN	overlapping	Schone van Boskoop	3
22. (+)	22. (+)	Flower: position of stigmas relative to anthers	below	Alkmene	1		
			QN	QN	same level	Cox's Orange Pippin	2
					above	Golden Delicious	3
23. QN	23. QN	Young fruit: extent of anthocyanin overcolour	absent or very small	Grenadier, Norhey	1		
			small	Fuji	3		
			medium	Idared	5		
			large	Elise	7		
			very large	Weirouge	9		

CPVO N°	UPOV N°	Characteristics	Examples	Note	
24. QN	24. QN	Fruit: size	very small	Api Noir	1
			very small to small	Golden Harvey	2
			small	Akane, Miller's Seedling	3
			small to medium	Alkmene	4
			medium	Cox's Orange Pippin	5
			medium to large	Gravensteiner	6
			large	Mutsu	7
			large to very large	Bramley's Seedling	8
			very large	Howgate Wonder	9
25. QN	25. QN	Fruit: height	short	Auralia	3
			medium	James Grieve	5
			tall	Čadel, Iduna	7
26. QN	26. QN	Fruit: diameter	small	Orei	3
			medium	Golden Delicious	5
			large	Melrose	7
27. QN	27. QN	Fruit: ratio height/diameter	very small	Court Pendu Plat, Ingol	1
			small	Idared, Ontario	3
			medium	Jonagold	5
			large	Golden Delicious	7
			very large	Iduna, Priam	9
28. PQ	28. PQ	Fruit: general shape	cylindrical waisted	Starkrimson Delicious	1
			conic	Jonagold	2
			ovoid	Summerred	3
			cylindrical	Gravensteiner, Mutsu	4
			ellipsoid	Spencer	5
			globose	Gloden Noble, Resi	6
			obloid	Bramley's Seddling, Idared	7

CPVO N°	UPOV N°	Characteristics		Examples	Note		
29.	29.	Fruit: ribbing	absent or weak	Charles Ross, Discovery	1		
			moderate	Golden Delicious	2		
			strong	Red Delicious, Reinette Russet	3		
30.	30.	Fruit: crowning at calyx end	absent or weak	Charles Ross, Discovery, Granny Smith	1		
			moderate	Cox's Orange Pippin, Jonagold	2		
			strong	Red Delicious	3		
31.	31.	Fruit: size of eye	small	McIntosh	3		
			(*)	medium	Cox's Orange Pippin	5	
			Q.N	Q.N	large	Ingol, Monarch	7
32.	32.	Fruit: length of sepal	short	McIntosh	3		
			Q.N	Q.N	medium	Alkmene	5
					long	Gala	7
33.	33.	Fruit: bloom of skin	absent or weak	Golden Delicious	1		
			(*)	moderate	James Grieve, Jonathan	2	
			Q.N	Q.N	strong	Vicking, Vista Bella	3
34.	34.	Fruit: greasiness of skin	absent or weak	Schone van Boskoop	1		
			Q.N	Q.N	moderate	James Grieve	2
					strong	Arlet, Jonagold	3
35.	35.	Fruit: ground colour	not visible	Red Jonaprince	1		
			(*)	whitish yellow	Silken	2	
			P.Q	P.Q	yellow	Delorgue, Gala, Transparente de Croncels	3
					whitish green	Angold, Lodi, Lena, White Transparent	4
					yellow green	Cox's Orange Pippin	5
					green	Granny Smith	6

CPVO N°	UPOV N°	Characteristics	Examples	Note		
36.	36.	Fruit: relative area of over colour	absent or very small	Granny Smith	1	
	(*)		small	Auralia, Cox's Orange Pippin	3	
	QN		QN	medium	Gala	5
			large	Spartan	7	
			very large	Red Jonaprince	9	
37.	37.	Fruit: hue of over colour – with bloom removed	orange red	Cox's Orange Pippin, Egremont Russet	1	
	(*)		pink red	Cripps Pink, Delorgue	2	
	PQ		PQ	red	Akane, Galaxy, Red Elstar, Regal Prince	3
				purple red	Red Jonaprince, Spartan	4
				brown red	Fiesta, Joburn, Lord Burghley	5
38.	38.	Fruit: intensity of over colour	light		3	
	(*)		medium	<i>see explanation</i>	5	
	(+)		(+)	dark		7
QN	QN					
39.	39.	Fruit: pattern of over colour	only solid flush	Red Jonaprince, Richared Delicious	1	
	(*)		solid flush with weakly defined stripes	Obrogala	2	
	PQ		PQ	solid flush with strongly defined stripes	Jonagored	3
				weakly defined flush with strongly defined stripes	Gravensteiner	4
				only stripes (no flush)	Helios	5
				flushed and mottled	Elstar	6
				flushed, striped and mottled	Jonagold	7

CPVO N°	UPOV N°	Characteristics		Examples	Note
40.	40. (* QN	Fruit: width of stripes	narrow	Eden, Pinova, Pirella	3
			medium	Rubinola, Tenroy	5
			broad	Baigent, Caudle	7
41.	41. (* QN	Fruit: area of russet around stalk attachment	absent or small	Elstar, Granny Smith, Piros	1
			medium	Alkmene	2
			large	Egremont Russet, Kaiser Wilhelm	3
42.	42. QN	Fruit: area of russet on cheeks	absent or small	Golden Noble	1
			medium	Karmijn de Sonnaville	2
			large	Egremont Russet, Zabergäu Reinette	3
43.	43. (* QN	Fruit: area of russet around eye basin	absent or small	Golden Noble	1
			medium	Cox's Orange Pippin	2
			large	Arlet	3
44.	44. QN	Fruit: number of lenticels	few	James Grieve	3
			medium	Golden Delicious	5
			many	Granny Smith	7
45.	45. QN	Fruit: size of lenticels	small	Idared, Jonathan	3
			medium	Elstar	5
			large	Florina, Reine des Reinettes	7
46.	46. (* QN	Fruit: length of stalk	very short	Egremont Russet	1
			short	Cox's Orange Pippin	3
			medium	Worcester Pearmain	5
			long	Richared Delicious	7
			very long	Pinova, Rewena, Sirprize	9
47.	47. (* QN	Fruit: thickness of stalk	thin	Golden Delicious	3
			medium	Cox's Orange Pippin	5
			thick	Schone van Boskoop	7

CPVO N°	UPOV N°	Characteristics		Examples	Note
48.	48. (* (+)	Fruit: depth of stalk cavity	shallow	Edward VII	3
			medium	Golden Delicious	5
			deep	Jonagold, Schone van Boskoop	7
49.	49. (* (+)	Fruit: width of stalk cavity	narrow	Beauty of Bath, Gala	3
			medium	Golden Delicious	5
			broad	Jonagold	7
50.	50. (* (+)	Fruit: depth of eye basin	shallow	Worcester Pearmain	3
			medium	Golden Delicious	5
			deep	Bramley's Seedling, Delcorf	7
51.	51. (* (+)	Fruit: width of eye basin	narrow	Pinova, Worcester Pearmain	3
			medium	Golden Delicious	5
			broad	Bramley's Seedling	7
52.	52. (* (+)	Fruit: firmness of flesh	very soft	Astrachan	1
			soft	Jonagold	3
			medium	Cox's Orange Pippin	5
			firm	Kent	7
			very firm	Pilot, Scifresh	9
53.	53. (* PQ	Fruit: colour of flesh	white	Akane, Spartan	1
			cream	Jonagold	2
			yellowish	Delorina, Topaz	3
			greenish	Gloster, Granny Smith	4
			pinkish	Pomfit	5
			reddish	Weirouge	6

CPVO N°	UPOV N°	Characteristics		Examples	Note
54.	54. (*)	Fruit: aperture of locules (in transverse section)	closed or slightly open	Idared, Worcester Pearmain	1
(+)	(+)		moderately open	Reine de Reinettes, Šampion	2
QN	QN		fully open	McIntosh	3
55.	55. (*)	Time of beginning of flowering	very early	Anna, Ein-Shemer	1
(+)	(+)		early	Idared, Schone van Booskoop	3
QN	QN		medium	Cox's Orange Pippin, Jonagold	5
			late	Court Pendu Plat, Rall's Janet	7
			very late	Feuilmorte, Spätblühender Taffetapfel	9
56.	56.	Time for harvest	very early	Vista Bella	1
(+)	(+)		early	Discovery, Jersey mac, Sunrise	3
QN	QN		medium	Cox's Orange Pippin, Elstar, Gala	5
			late	Jonagold	7
			very late	Granny Smith, Cripps Pink, Fuji	9

CPVO N°	UPOV N°	Characteristics	Examples	Note	
57.	57. (*)	Time of eating maturity	very early	Vista Bella	1
(+)	(+)		very early to early	White Transparent	2
QN	QN		early	Discovery, Jersey mac, Mountain Cove, Sunrise	3
			early to medium	Akane, James Grieve, Summerred	4
			medium	Elstar, Gala, Honeycrisp	5
			medium to late	Ambrosia, Spartan, Šampion	6
			late	Golden Delicious	7
			late to very late	Fuji	8
			very late	Cripps Pink, Granny Smith	9

EXPLANATIONS AND METHODS

Ad. 1 : Tree: vigour

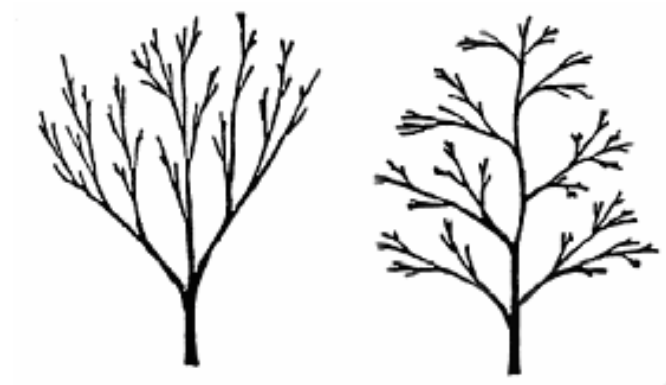
Observation of the tree vigour should be made in summer when the tree is in peak vegetative growth.

Ad. 2 : Tree: type

Columnar: a compact spur-type tree form with virtually no side branches. Closely spaced short fruiting spurs are produced along the main stem.

Ramified: form where trees have well developed branches.

Ad. 3 : Only varieties with ramified tree type: Tree: habit



1
upright

2
spreading



3
drooping

4
weeping

Ad. 4 : Tree: type of bearing



1
on spurs only



2
on spurs and long shoots



3
on long shoots only

Ad. 5 : One-year-old shoot: thickness

The diameter of the dormant one-year-old shoots should be observed in the centre of the middle internode with a Vernier calliper gauge.

Ad. 6 : One-year-old-shoot : length of internode

The length of internode of the dormant one-year-old shoot should be observed in the middle third of the one-year-old vegetative shoot.

Ad. 10 : Leaf blade: attitude in relation to shoot



1
upwards



2
outwards



3
downwards

Ad. 15 : Leaf blade: incisions of margin (upper half)

The predominant type of incision should be observed.



1
crenate



2
bicrenate



3
serrate type 1



4
serrate type 2

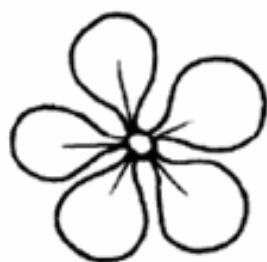


5
biserrate

Ad. 19 : Flower: predominant colour at balloon stage

‘Balloon stage’ is the phenological stage in the course of flower development when the calyx is fully expanded and the petals are recognizable, having partially expanded and inflated but are closed, covering the internal flower organs. Balloon stage is usually 1-2 days before the petals unfold.

Ad. 21 : Flower: arrangement of petals



1
free



2
intermediate

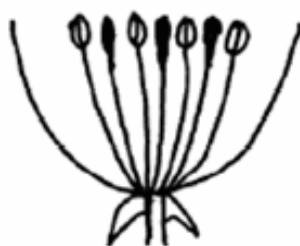


3
overlapping

Ad. 22 : Flower: position of stigmas relative to anthers



1
below



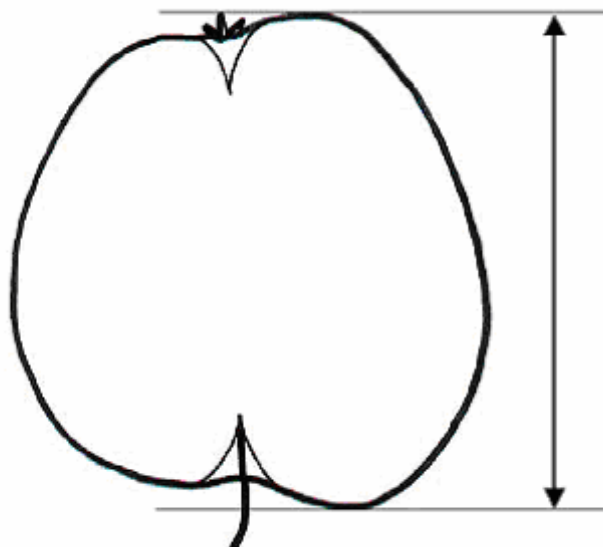
2
same level



3
above

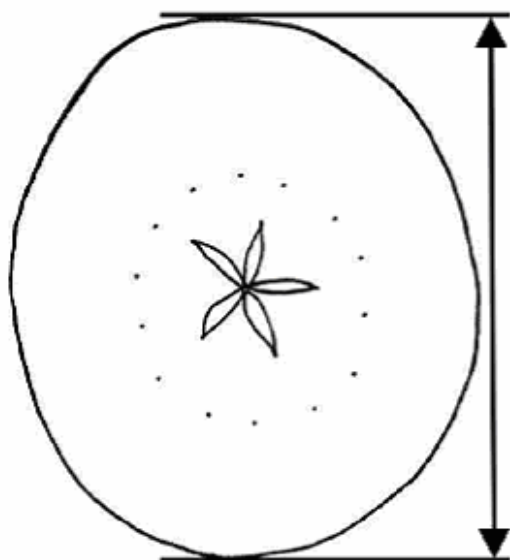
Ad 25 : Fruit: height

The maximum height should be observed.

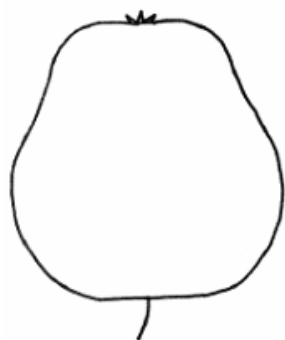


Ad 26 : Fruit: diameter

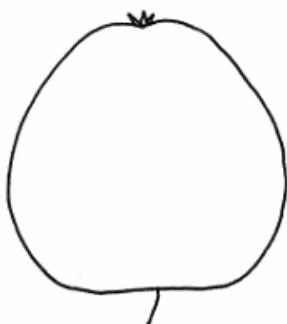
The maximum diameter should be observed.



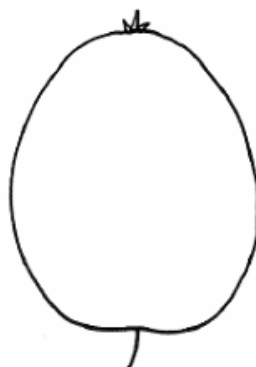
Ad. 28 : Fruit: general shape



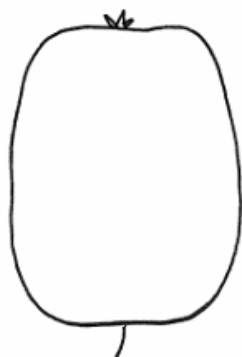
1
cylindrical waisted



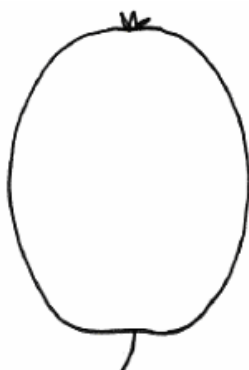
2
conic



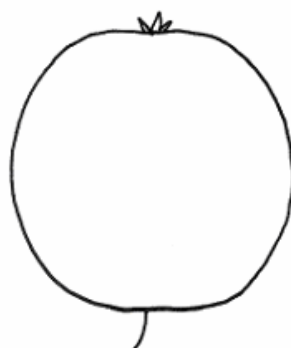
3
ovoid



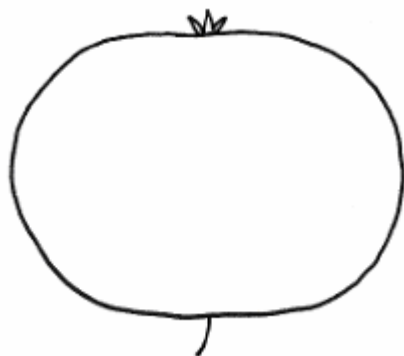
4
cylindrical



5
ellipsoid



6
globose



7
obloid

Additional example varieties with conic shape (state 2):

		Fruit: ratio height/diameter (char. 27)				
		very small	small	medium	large	very large
Fruit: maximum height (char. 25)	short	Regia	Cox's Orange Pippin			
	medium		Melodie	Kidd's Orange Red	Pinova	
	tall			Jonagold		Kent, Adam's Pearmain, Saturn

Additional example varieties with obloid shape (state 7):

		Fruit: ration height/diameter (char. 27)	
		very small	small
Fruit: maximum height (char. 25)	very short	Court Pendu Plat	
	short	Discovery	
	medium		Idared
	tall		Bramley's Seedling

Ad. 38 : Fruit: intensity of overcolour

		Fruit: intensity of over colour (char. 38)		
		light	medium	dark
Fruit: hue of overcolour – with bloom removed (char. 43)	orange red	Egremont Russet, Scigold, Sirprize	Cox's Orange Pippin, Reine des Reinette	
	pink red	Lady Williams	Cripps Pink	Delorgue
	red	Winter Banana	Gala	Akane, Galaxy, Red Elstar, Regal Prince
	purple red			Red Jonaprince, Spartan
	brown red	Sturmer Pippin	Fiesta	Joburn, Lord Burgley

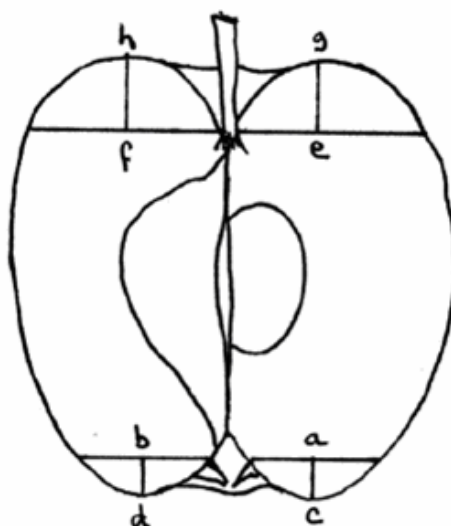
Ad. 48, 49, 50, 51 : Fruit: depth and width of stalk cavity, depth and width of eye basin

Fruits should be cut through the central axis as accurately as possible. Stalk cavity and eye basin depth and width should be measured from the sectioned fruits. The following diagram indicated the position of lines scored, using a knife or scalpel, on the fruit prior to measuring these characteristics.

- The lines a-b and e-f should be at right angles to the axis of the fruit. (A plastic protractor can be used to ensure accuracy).
- The line a-b is marked at the base of the sepals.
- The line e-f is marked at the insertion of the stalk.
- The line a-c and b-d indicate the eye basin depth. They are drawn at right angles to the line a-b to the point where the basin curve levels out.
- The line e-g and f-h indicate the stalk cavity depth. They are drawn at right angles to the line e-f to the point where the stalk cavity curve levels out.
- In the case of asymmetric or irregular sections, the larger side should be considered.

f-h = depth of stalk
cavity (characteristic 48)

e-f = width of stalk cavity
(characteristic 49)



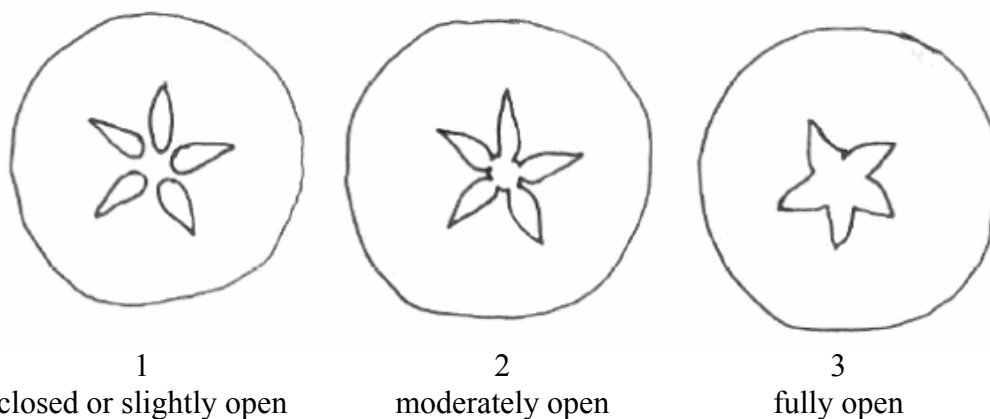
a-b = width of eye basin
(characteristic 50)

a-c = depth of eye basin
(characteristic 51)

Ad. 52 : Fruit: firmness of flesh

Firmness of flesh should be assessed at time of ripeness for eating. It can be measured using a penetrometer.

Ad 54 : Fruit: aperture of locules (in transverse section)



Ad 55 : Time of beginning of flowering

Time of beginning of flowering is when 10% of the flowers are fully open.

Ad 56 : Time for harvest

Time for harvest is the optimum time of picking to achieve fruit in peak condition for eating (see Ad. 57).

Ad 57 : Time of eating maturity

Time of eating maturity is the period when a fruit has reached optimum color, firmness, texture, aroma and flavor for consumption. Depending on the type of fruit, this period can occur directly after removal from the tree (e.g. early varieties) or after a period of storage or conditioning (e.g. later varieties).

8.3 *Other names of example varieties*

Example varieties	Synonyms
Auralia	Tumanga
Cox's Orange Pippin	Cox Orangenrenette
Gloster	Gloster 69
Golden Delicious	Gelber Köstlicher
Golden Noble	Gelber Edelapfel
Gravensteiner	Graasten
Nouvelle Europe	New Europe
Red Jonaprince	Jonaprince; Red Prince
Regal Prince	Prince Gala
Reine des Reinettes	Goldparmäne; Plassart; Wintergoldparmäne
Šampion	Shampion
Schone van Boskoop	Belle de Boskoop; Schöner aus Boskoop
White Transparent	Papirovska ; Transparente Jaune; Weißer Klarapfel

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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

Malus domestica Borkh.

APPLE

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

(i.) Seedling of unknown parentage []

(ii.) Produced by controlled pollination

(a) Seed bearing parent []

(b) Pollen parent []

(iii.) Produced by open pollination of : []

(iv.) Mutation or sport from []

4.2 In vitro propagation

The plant material has been obtained by *in vitro* propagation

[] Yes [] No

4.3 Pollinator

Good pollinators are the following varieties :

4.4 Virus status

The variety is :

(i.) virus free (indicate viruses) []

(ii.) virus tested (indicate against which virus) []

(iii.) the virus status is unknown..... []

4.5 Other information on genetic origin and breeding method

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

4.7 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)	Tree: type		
	columnar	MacExel, Wijcik	1 []
	ramified	Elstar, Golden Delicious	2 []
5.2 (3)	<u>Only varieties with ramified tree type:</u> Tree: habit		
	upright	Benoni, Gloster	1 []
	spreading	Bramley's Seedling, Jonagold	2 []
	drooping	Jonathan	3 []
	weeping	Neild's Drooper, Rome Beauty	4 []
5.3 (28)	Fruit: general shape		
	cylindrical waisted	Starkrimson Delicious	1 []
	conic	Jonagold	2 []
	ovoid	Summerred	3 []
	cylindrical	Gravensteiner, Mutsu	4 []
	ellipsoid	Spencer	5 []
	globose	Golden Noble, Resi	6 []
	obloid	Bramley's Seedling, Idared	7 []
5.4 (36)	Fruit: relative area of over colour		
	absent or very small	Granny Smith	1 []
	small	Auralia, Cox's Orange Pippin	3 []
	medium	Gala	5 []
	large	Spartan	7 []
	very large	Red Jonaprince	9 []

Characteristics	Example varieties	Note
5.5 (37)	Fruit: hue of over colour – with bloom removed	
	orange red	Cox's Orange Pippin, Egremont Russet
	pink red	Cripps Pink, Delorge
	red	Akane, Galaxy, Red Elstar, Regal Prince
	purple red	Red jonaprince, Spartan
	brown red	Fiesta, Joburn, Lord Burghley
5.6 (39)	Pattern of over colour	
	only solid flush	Red Jonaprince, Richared Delicious
	solid flush with weakly defined stripes	Obro Gala
	solid flush with strongly defined stripes	Jonagored
	weakly defined flush with strongly defined stripes	Gravensteiner
	only stripes (no flush)	Helios
	flushed and mottled	Elstar
	flushed, striped and mottled	Jonagold
5.7 (55)	Time of beginning of flowering	
	very early	Anna, Ein-Shemer
	early	Idared
	medium	Cox's Orange Pippin, Jonagold
	late	Court Pendu Plat, Rall's Janet
	very late	Feuilmorte, Späthblühender Taffetapfel

Characteristics		Example varieties	Note
5.8 (57)	Time of eating maturity		
	very early	Vista Bella	1 []
	very early to early	White Transparent	2 []
	early	Discovery, Jersey mac, Mountain Cove, Sunrise	3 []
	early to medium	Akane, James Grieve, Summerred	4 []
	medium	Elstar, Gala, Honeycrisp	5 []
	medium to late	Ambrosia, Spartan, Šampion	6 []
	late	Golden Delicious	7 []
	late to very late	Fuji	8 []
very late	Cripps Pink, Granny Smith	9 []	
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
<p>¹⁾ In the case of identical states of expressions of both varieties, please indicate the size of the difference</p>			
7. Additional information which may help to distinguish the variety			
A representative printed-out colour photo of the variety must be added to the Technical Questionnaire.			
7.1 Resistance to pests and diseases			

7.2 Special conditions for the examination of the variety

YES, please specify

NO

7.3 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 EC 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.

9. Information on plant material to be examined

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 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 the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

- | | | |
|---|------------------------------|-----------------------------|
| (a) Microorganisms (e.g. virus, bacteria, phytoplasma) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| (b) Chemical treatment (e.g. growth retardant or pesticide) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| (c) Tissue culture | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| (d) Other factors | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Please provide details of where you have indicated “Yes”:

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]