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UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DURUM WHEAT

UPOV Code: TRITI_TUR_DUR

Triticum turgidum L. subsp. *durum* (Desf.) Husn. *

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Triticum turgidum L. subsp. *durum* (Desf.) Husn., *Triticum durum* Desf., *Triticum turgidum* subsp. *turgidum* conv. *durum* (Desf.) MacKey, *Triticum turgidum* L.	Durum Wheat, Hard Wheat, Macaroni Wheat Pasta Wheat	Blé dur	Durumweizen, Hartweizen	Trigo Duro

The purpose of these guidelines ("Test Guidelines") is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

ASSOCIATED DOCUMENTS

These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents.

* These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Triticum turgidum* L. subsp. *durum* (Desf.) Husn.

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of seed.

2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:

Seed: 5 kg and
Ears (if requested): 100.

The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority. In cases where the seed is to be stored, the germination capacity should be as high as possible and should, be stated by the applicant. Ears should contain a sufficient number of viable seeds to establish a satisfactory row of plants for observation.

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.5 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination

3.1 Number of Growing Cycles

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

3.2 Testing Place

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 “Examining Distinctness”.

3.3 Conditions for Conducting the Examination

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

3.3.2 Stage of development for the assessment

The optimum stage of development for the assessment of each characteristic is indicated by a number in the second column of the Table of Characteristics. The stages of development denoted by each number are described in the descriptions of the growth stages of the Zadoks decimal code for cereals in Chapter 8.3**.**

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 2,000 plants, which should be divided between at least 2 replicates. The assessment for the characteristic 'Seasonal type' should be carried out on at least 300 plants.

3.4.2 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.4.3 Single ear rows: if tests on ear rows are conducted, at least 100 ear rows should be observed.

3.4.4 In case of hybrids, the parent lines have to be included in the test and should be tested and assessed as any other self-pollinating variety. The observations on the hybrid variety itself should be made on at least 200 plants

3.5 Additional Tests

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 Distinctness

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines.

4.1.2 Consistent Differences

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

4.1.3 Clear Differences

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

4.1.4 Number of Plants / Parts of Plants to be Examined

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

4.1.5 Method of Observation

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

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

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

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

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

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

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

4.2 Uniformity

4.2.1 It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

4.2.2 For the assessment of uniformity, in a sample of 2,000 plants, a population standard of 0.1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 2,000 plants, 5 off-types are allowed. Characteristics which should be observed on a sample size of 2,000 plants are indicated by a "B" in the Table of Characteristics.

4.2.3 For the assessment of uniformity in a sample of 100 plants or parts of plants and ear-rows, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 100 plants, parts of plants or ear-rows, 3 off-types plants/ear-rows are allowed. An ear-row is considered to be an off-type if there is more than one off-type plant within that ear row. Characteristics which should be observed on a sample size of 100 plants are indicated by an "A" in the Table of Characteristics.

4.2.4 For these "A" characteristics, with the exception of characteristic 1, the assessment of uniformity can be done in 2 steps. In a first step, 20 plants or parts of plants are observed. If no off-types are observed, the variety is declared to be uniform. If more than 3 off-types are observed, the variety is declared not to be uniform. If 1 to 3 off-types are observed, an additional sample of 80 plants or parts of plants must be observed.

4.3 Stability

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

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

5. Grouping of Varieties and Organization of the Growing Trial

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

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

5.3 The following have been agreed as useful grouping characteristics:

(a) Lower glume: hairiness of external surface (characteristic 19)
(b) Straw: pith in cross section (characteristic 20)
(c) Awn: color (characteristic 21)
(d) Ear: coloration (characteristic 23)
(e) Grain: coloration with phenol (characteristic 27)
(f) Plant: seasonal type (characteristic 28)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 “Examining Distinctness”.

6. Introduction to the Table of Characteristics

6.1 Categories of Characteristics

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 States of Expression and Corresponding Notes

6.2.1 States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description.

6.2.2 In the case of qualitative and pseudo-qualitative characteristics (see Chapter 6.3), all relevant states of expression are presented in the characteristic. However, in the case of quantitative characteristics with 5 or more states, an abbreviated scale may be used to minimize the size of the Table of Characteristics. For example, in the case of a quantitative characteristic with 9 states, the presentation of states of expression in the Test Guidelines may be abbreviated as follows:

State	Note
small	3
medium	5
large	7

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

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

6.2.3 Further explanation of the presentation of states of expression and notes is provided in document TGP/7 “Development of Test Guidelines”.

6.3 Types of Expression

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction.

6.4 Example Varieties

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

6.5 Legend

(*) Asterisked characteristic – see Chapter 6.1.2

QL Qualitative characteristic – see Chapter 6.3
QN Quantitative characteristic – see Chapter 6.3
PQ Pseudo-qualitative characteristic – see Chapter 6.3

MG, MS, VG, VS – see Chapter 4.1.5

A: Sample size of 100 plants required for uniformity – see Chapter 4.2.3
B: Sample of 2,000 plants required for uniformity – see Chapter 4.2.2
C: Additional test – see Chapter 3.5

(a) See Explanations on the Table of Characteristics in Chapter 8.1
(+) See Explanations on the Table of Characteristics in Chapter 8.2

0-92 See Explanations on the Table of Characteristics in Chapter 8.3

7. Table of Characteristics/Tableau des caractères/Merkmalstabelle/Tabla de caracteres

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
1. **(+)**	**09-11 VG C A**	**Coleoptile: anthocyanin coloration**	**Coléoptile : pigmentation anthocyanique**	**Koleoptile: Anthocyanfärbung**	**Coleóptilo: pigmentación antociánica**		
QN		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Fara, Kronos, Valgiorgio	1
		weak	faible	gering	débil	Campomoro	3
		medium	moyenne	mittel	media	Capdur, Chandur, Yallaroi	5
		strong	forte	stark	fuerte	Kamilaroi, Primadur, Wollaroi	7
		very strong	très forte	sehr stark	muy fuerte	EGA Bellaroi, Miradur, Tamaroi	9
2. **(*)** **(+)**	**25-29 VG B**	**Plant: growth habit**	**Plante : port**	**Pflanze: Wuchsform**	**Planta: porte**		
QN		erect	dressé	aufrecht	erecto	EGA Bellaroi	1
		semi-erect	demi-dressé	halbaufrecht	semierecto	Kronos	3
		intermediate	demi-dressé à demi-étalé	intermediär	intermedio	Don Sebastian, Tamaroi, Valnova, Yallaroi	5
		semi-prostrate	demi-étalé	halbliegend	semipostrado	Buck Aguará, Buck Ambar, Buck Granate, Buck Topacio	7
		prostrate	étalé	liegend	postrado		9

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
3.	**50-51 VG B**	**Frequency of plants with recurved flag leaves**	**Fréquence des plantes avec la dernière feuille retombante**	**Häufigkeit von Pflanzen mit gebogenen Fahnenblättern**	**Frecuencia de plantas con hoja bandera recurvada**		
QN		absent or very low	nulle ou très faible	fehlend oder sehr gering	ausente o muy baja	Bolo, Roqueño	1
		low	faible	gering	baja	Don Jose	3
		medium	moyenne	mittel	media		5
		high	élevée	hoch	alta		7
		very high	très élevée	sehr hoch	muy alta	Capdur	9
4. (*) (+)	**50-51 MG B**	**Time of ear emergence**	**Époque d'épiaison**	**Zeitpunkt des Ährenschiebens**	**Época de espigado**		
QN		early	précoce	früh	temprana	Don Jose	3
		medium	moyenne	mittel	media	Arrivato, Don Sebastian, Tamaroi, Yallaroi	5
		late	tardive	spät	tardía	Kronos	7
5.	**55-59 VG A**	**Flag leaf: anthocyanin coloration of auricles**	**Dernière feuille : pigmentation anthocyanique des oreillettes**	**Fahnenblatt: Anthocyanfärbung der Blatthäutchen**	**Hoja bandera: pigmentación antociánica de las aurículas**		
QN		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Kamilaroi, Tamaroi	1
		weak	faible	gering	débil	Carpio, Yallaroi	2
		medium	moyenne	mittel	media	Don Jose	3
		strong	forte	stark	fuerte	Carioca, Wollaroi	4
		very strong	très forte	sehr stark	muy fuerte		5

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
6. (*)	**55-65 VG B**	**Flag leaf: glaucosity of sheath**	**Dernière feuille : glaucescence de la gaine**	**Fahnenblatt: Bereifung der Blattscheide**	**Hoja bandera: glauescencia de la vaina**		
QN		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Capeiti 8	1
		weak	faible	gering	débil	Hyperno	3
		medium	moyenne	mittel	media	Kalka	5
		strong	forte	stark	fuerte	Arrivato, Don José, Don Sebastian, Grandur, Yallaroi	7
		very strong	très forte	sehr stark	muy fuerte	Tamaroi, Valnova	9
7. (*)	**55-65 VG B**	**Flag leaf: glaucosity of lower side of leaf blade**	**Dernière feuille : glaucescence de la face inférieure du limbe**	**Fahnenblatt: Bereifung der Unterseite der Blattspreite**	**Hoja bandera: glauescencia del envés del limbo**		
QN		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	EGA Bellaroi	1
		weak	faible	gering	débil	Bolo, Grandur, Hyperno	3
		medium	moyenne	mittel	media		5
		strong	forte	stark	fuerte	Kalka	7
8. (+)	**55-69 VG B**	**Culm: density of hairiness of uppermost node**	**Tige : intensité de la pilosité du dernier nœud**	**Halm: Dichte der Behaarung des obersten Knotens**	**Tallo: densidad de la vellosidad del nudo superior**		
QN		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Don Sebastian	1
		weak	faible	gering	débil	Carpio, Esquilache, Grandur, Tamaroi	3
		medium	moyenne	mittel	media	Mexa, Yallaroi	5
		strong	forte	stark	fuerte	Arrivato	7

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
9. (*)	**60-69 VG B**	**Culm: glaucosity of neck**	**Tige : glaucescence du col de l'épi**	**Halm: Bereifung des obersten Internodiums**	**Tallo: glauescencia del cuello de la espiga**		
QN		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Capeiti 8	1
		weak	faible	gering	débil		3
		medium	moyenne	mittel	media	Don Jose	5
		strong	forte	stark	fuerte	Don Sebastian, Roqueño, Tamaroi	7
		very strong	très forte	sehr stark	muy fuerte	Kronos	9
10. (*)	**60-69 VG B**	**Ear: glaucosity**	**Épi : glaucescence**	**Ähre: Bereifung**	**Espiga: glauescencia**		
QN		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Capeiti 8	1
		weak	faible	gering	débil	Kronos	3
		medium	moyenne	mittel	media	Don Jose, Oscar, Yallaroi	5
		strong	forte	stark	fuerte	Don Sebastian, EGA Bellaroi, Grandur, Roqueño, Tamaroi	7
11. (*) (+)	**75-92 MG B**	**Plant: length**	**Plante : longueur**	**Pflanze: Länge**	**Planta: longitud**		
QN		very short	très courte	sehr kurz	muy corta	Gargiflash, Oscar	1
		short	courte	kurz	corta	Kamilaroi, Mexa	3
		medium	moyenne	mittel	media	Don Jose, Grandur, Yallaroi	5
		long	longue	lang	larga	Capelli, Tamaroi	7

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
12. (+)	**75-92 VG B**	**Ear: distribution of awns**	**Épi : répartition des barbes**	**Ähre: Verteilung der Grannen**	**Espiga: distribución de las barbas**		
PQ		awnless	sans barbes	grannenlos	sin aristas		1
		tip awned	extrémité barbue	nur an der Spitze	en el ápice	Saintly	2
		half awned	demi-barbu	obere Hälfte	en la mitad		3
		fully awned	sur toute la longueur	ganze Länge	en toda la espiga	Arrivato, Tamaroi	4
13. (*) (+)	**75-92 VG B**	**Ear: length of awns at tip relative to length of ear**	**Épi : longueur des barbes à l'extrémité par rapport à la longueur de l'épi**	**Ähre: Grannenlänge an der Spitze im Verhältnis zur Länge der Ähre**	**Espiga: longitud de las barbas en el extremo en relación con la longitud de la espiga**		
QN		shorter	plus courtes	kürzer	más cortas	Saintly	1
		equal	égales	gleich lang	iguales	Tamaroi	2
		longer	plus longues	länger	más largas	Arrivato, Oscar	3
14. (+)	**80-92 VG A**	**Lower glume: shape**	**Glume inférieure : forme**	**Hüllspelze: Form**	**Gluma inferior: forma**		
PQ	**(a)**	ovoid	ovoïde	eiförmig	ovoide	Carpio, Grandur, Kronos, Randur, Tamaroi	1
		medium oblong	moyennement oblongue	mittel rechteckig	oblonga media	Don Jose, Oscar, Yallaroi	2
		narrow oblong	oblongue étroite	schmal rechteckig	oblonga estrecha	Don Sebastian	3
15. (+)	**80-92 VG A**	**Lower glume: shape of shoulder**	**Glume inférieure : forme de la troncature**	**Hüllspelze: Form der Schulter**	**Gluma inferior: forma del hombro**		
PQ	**(a)**	sloping	inclinée	abfallend	puntiagudo	Don Jaime, Yallaroi	1
		rounded	arrondie	abgerundet	redondeado	Wollaroi	2
		straight	droite	gerade	recto	Don Jose, Hyperno, Roqueño	3
		elevated	échancrée	gehoben	elevado	Amilcar, Tamaroi	4
		elevated with a 2nd beak	échancrée avec présence d'un 2e bec	gehoben mit zweitem Zahn	elevado con presencia de un segundo pico	Capdur, Don Sebastian, Oscar, Saintly	5

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
16. (+)	**80-92 VG A**	**Lower glume: width of shoulder**	**Glume inférieure : largeur de la troncature**	**Hüllspelze: Breite der Schulter**	**Gluma inferior: anchura del hombro**		
QN	**(a)**	very narrow	très étroite	sehr schmal	muy estrecho	Don Sebastian	1
		narrow	étroite	schmal	estrecho	Oscar, Tamaroi	3
		medium	moyenne	mittel	medio	Kronos	5
		broad	large	breit	ancho		7
17.	**80-92 VG A**	**Lower glume: length of beak**	**Glume inférieure : longueur du bec**	**Hüllspelze: Länge des Zahns**	**Gluma inferior: longitud del pico**		
QN	**(a)**	very short	très court	sehr kurz	muy corto	Saintly	1
		short	court	kurz	corto	Tamaroi, Vitron	3
		medium	moyen	mittel	medio	Don Jose, Kailaroi	5
		long	long	lang	largo	Mellaria, Mexa	7
18. (+)	**80-92 VG A**	**Lower glume: curvature of beak**	**Glume inférieure : courbure du bec**	**Hüllspelze: Biegung des Zahns**	**Gluma inferior: curvatura del pico**		
QN	**(a)**	absent	nulle	fehlend	ausente	Durox, Mexa, Saintly	1
		weak	faible	gering	débil	Don Jose, Hyperno, Tamaroi	3
		moderate	moyenne	mäßig	moderada	Capdur, Don Jaime, Kamilaroi	5
		strong	forte	stark	fuerte		7
19. (*) (+)	**80-92 VG A**	**Lower glume: hairiness of external surface**	**Glume inférieure : pilosité de la face externe**	**Hüllspelze: Behaarung der äußeren Oberfläche**	**Gluma inferior: vellosidad de la superficie externa**		
QL	**(a)**	absent	absente	fehlend	ausente	Don Sebastian, Grandur, Hyperno, Roqueño	1
		present	présente	vorhanden	presente	Don Jose, Paramo, Wollaroi	9

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
20. (*) (+)	**90-92 VG A**	**Straw: pith in cross section**	**Paille : moelle en section transversale**	**Halm: Füllung im Querschnitt**	**Tallo: médula en la sección transversal**		
QN		thin	peu épaisse	dünn	delgada	Hyperno, Valnova	1
		medium	moyenne	mittel	media	Tamaroi	3
		thick	épaisse	dick	gruesa	line4210.23.6, Paramo	5
21. (*)	**90-92 VG B**	**Awn: color**	**Barbes : couleur**	**Granne: Farbe**	**Barba: color**		
PQ		white	blanc	weiß	blanco	Don Sebastian, Kronos	1
		light brown	brun clair	hellbraun	marrón claro	Kamailaroi, Yallaroi	2
		medium purple	pourpre moyen	mittelpurpurn	púrpura medio	line4210.23.6, Tejon	3
		dark purple	pourpre foncé	dunkelpurpurn	púrpura oscuro	Capdur, Don Jose, Tamaroi, Valnova	4
22. (*)	**90-92 MS A**	**Ear: length (excluding awns)**	**Épi : longueur (à l'exclusion des barbes)**	**Ähre: Länge (ohne Grannen)**	**Espiga: longitud (excluidas las barbas)**		
QN		short	court	kurz	corta	Don Jaime	3
		medium	moyen	mittel	media	Arrivato, Don Jose, Kronos, Tamaroi	5
		long	long	lang	larga	Valnova	7
23. (*)	**90-92 VG B**	**Ear: coloration**	**Épi : coloration**	**Ähre: Färbung**	**Espiga: coloración**		
PQ		white	blanc	weiß	blanco	Don Jose, Valdur, Yallaroi	1
		slightly colored	faiblement coloré	schwach gefärbt	ligeramente coloreada	Randur	2
		strongly colored	fortement coloré	stark gefärbt	muy coloreada	Kronos, Tamaroi	3

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
24. (*) (+)	**92 VG/ MS A**	**Ear: density**	**Épi : compacité**	**Ähre: Dichte**	**Espiga: densidad**		
QN		lax	lâche	locker	laxa	Kamilaroi	3
		medium	demi-lâche à demi-compact	mittel	media	Kalka, Roqueño, Vitron	5
		dense	compact	dicht	densa	Arrivato, Don Jose	7
25. (*) (+)	**92 VG A**	**Grain: length of brush hair**	**Grain : longueur des poils de la brosse**	**Korn: Länge der Behaarung**	**Grano: longitud de los pelos del pincel**		
QN		short	courts	kurz	cortos	Kalka	1
		medium	moyens	mittel	medianos	Chandur, Roqueño	3
		long	longs	lang	largos	Arrivato, Buck Topacio, Valdur	5
26. (+)	**92 MS/ VG A**	**Grain: shape**	**Grain : forme**	**Korn: Form**	**Grano: forma**		
QN		slightly elongated	légèrement allongé	leicht langgezogen	ligeramente alargada	Arrivato	1
		moderately elongated	modérément allongé	mäßig langgezogen	moderatamente alargada	Bolo, Tamaroi, Vitron	2
		strongly elongated	fortement allongé	stark langgezogen	fuertemente alargada	EGA Bellaroi	3
27. (*) (+)	**92 VG C**	**Grain: coloration with phenol**	**Grain : coloration au phénol**	**Korn: Phenolfärbung**	**Grano: coloración al fenol**		
QN		absent or very light	nulle ou très faible	fehlend oder sehr hell	ausente o muy ligera	Don Jose, Hyperno	1
		light	faible	hell	ligera		3
		medium	moyenne	mittel	media	Burgos, Randur	5
		dark	forte	dunkel	oscura		7

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
28. (*) (+)	**VG C**	**Plant: seasonal type**	**Plante : type de développement**	**Pflanze: Wechselverhalten**	**Planta: tipo de desarrollo**		
PQ		winter type	type hiver	Winterform	tipo de invierno		1
		alternative type	type alternatif	Wechselform	tipo alternativo	Valmora	2
		spring type	type printemps	Sommerform	tipo de primavera	Kalka, Saintly	3

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

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

(a) All observations on the spikelet should be made in the mid-third of the ear.

8.2 Explanations for individual characteristics

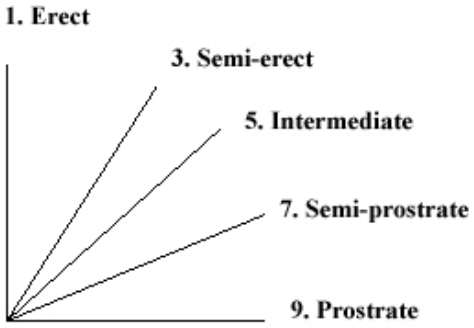
Ad. 1: Coleoptile: anthocyanin coloration

Method for the Determination of Anthocyanin Coloration

Number of grains per test	100 grains for distinctness and uniformity
Preparation of grains	Set up non-dormant grains on moistened filter paper with a Petri dish lid during germination
Place	Laboratory or glasshouse
Light	After the coleoptiles have reached a length of about 1 cm in darkness, they are placed in artificial light (daylight equivalent), 12,000 to 15,000 lux continuously for 3 - 4 days
Temperature	15 to 20°C.
Time of recording	Coleoptiles fully developed (about 1 week) at stage 09-11
Scale of recording	See characteristic 1 in the Table of Characteristics

Ad. 2: Plant: growth habit

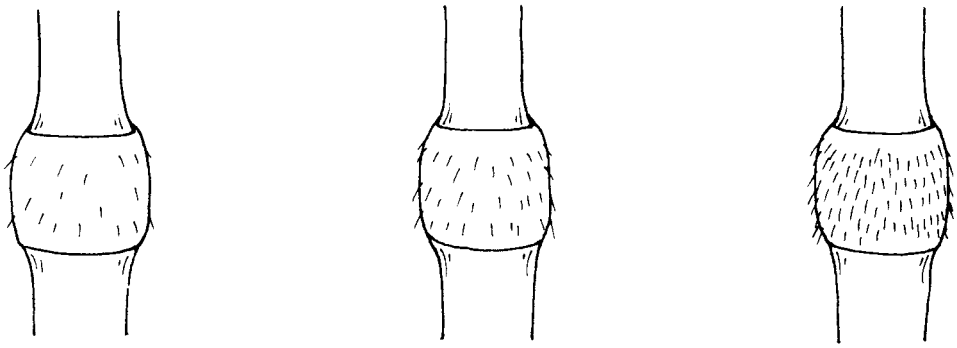
The growth habit should be assessed visually from the attitude of the leaves and tillers at tillering stage (growth stages 25-29). The angle formed by the outer leaves and the tillers with an imaginary middle axis should be used.



Ad. 4: Time of ear emergence

The time of ear emergence is reached when the first spikelet is visible on ears of 50% of the plants.

Ad. 8: Culm: density of hairiness of uppermost node



3	5	7
weak	medium	strong

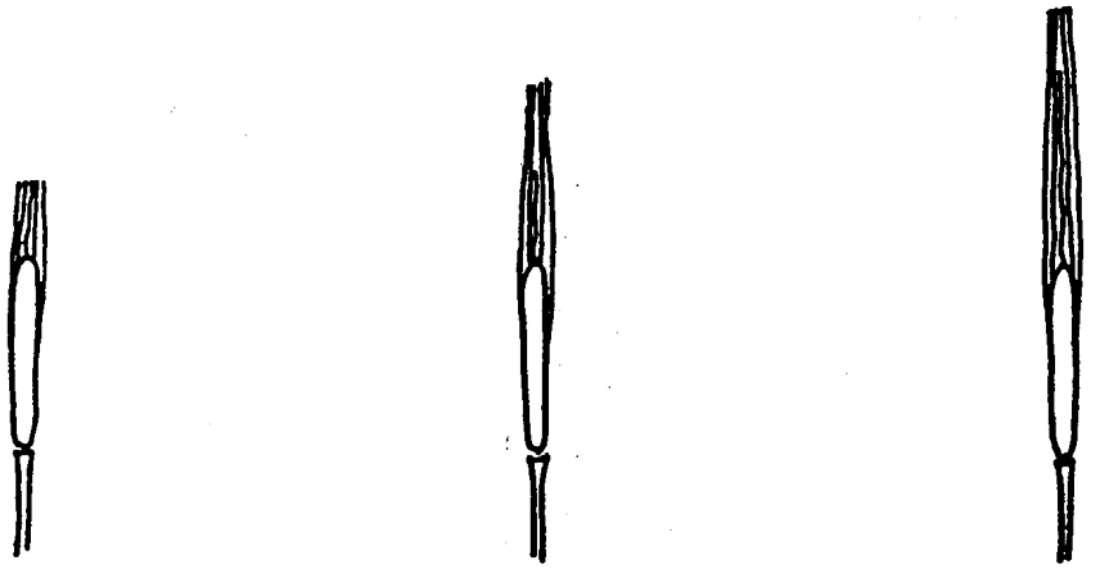
Ad. 11: Plant: length

Plant length should be measured including stem, ear and awn. The length is taken from the base of the plant to the tip of the highest awn.

Ad. 12: Ear: distribution of awns

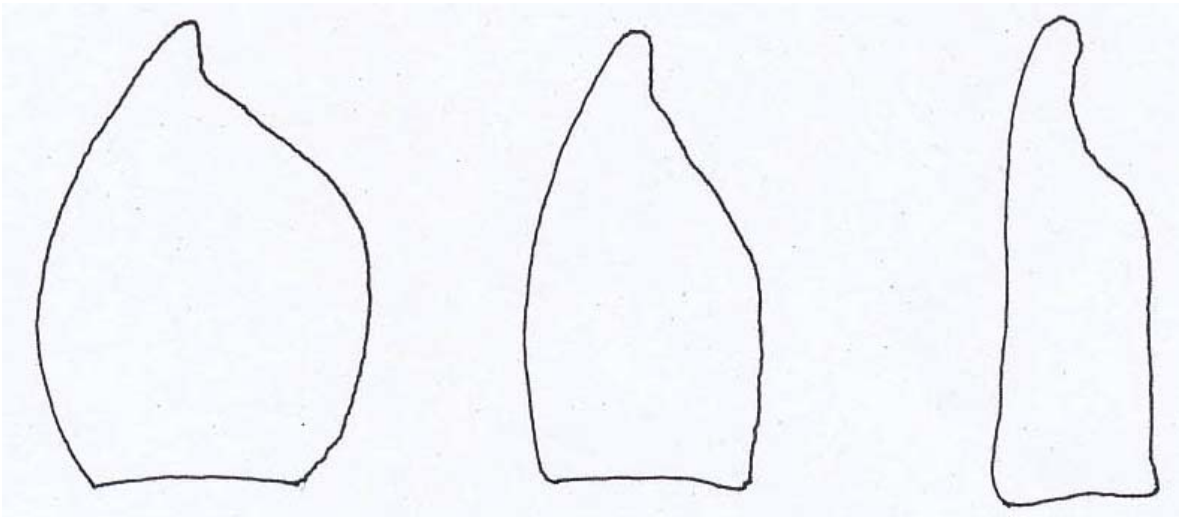
1	2	3	4
awnless	tip awned	half awned	fully awned

Ad. 13: Ear: length of awns at tip relative to length of ear



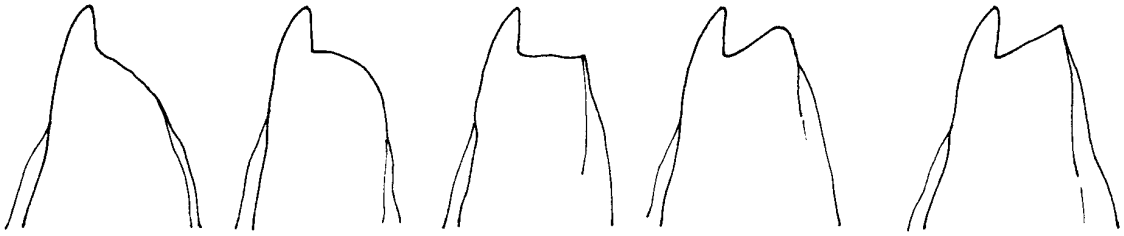
1	2	3
shorter	equal	longer

Ad. 14: Lower glume: shape



1	2	3
ovoid	medium oblong	narrow oblong

Ad. 15: Lower glume: shape of shoulder

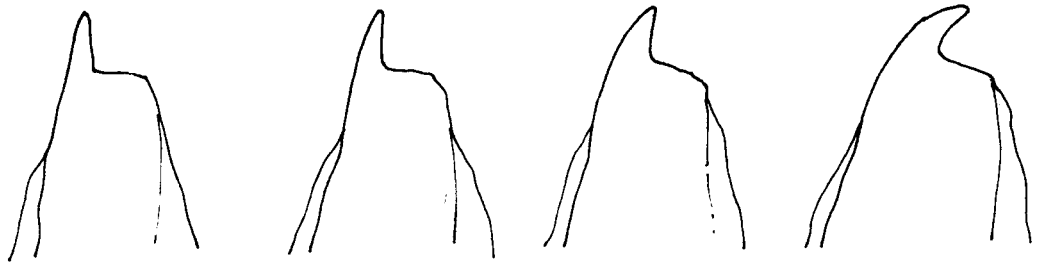


1	2	3	4	5
sloping	rounded	straight	elevated	elevated with a 2nd beak

Ad. 16: Lower glume: width of shoulder

3	5	7
narrow	medium	broad

Ad. 18: Lower glume: curvature of beak

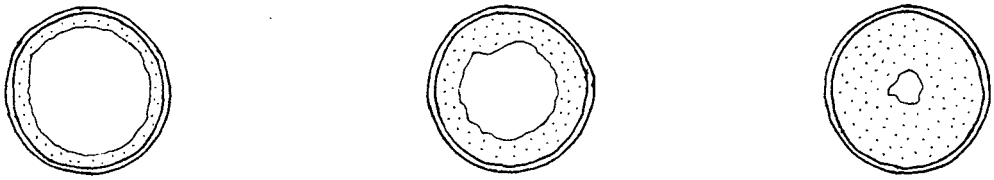


1 absent | 3 weak | 5 moderate | 7 strong

Ad. 19: Lower glume: hairiness of external surface

Observations should be made with a hand lens (x10 magnification).

Ad. 20: Straw: pith in cross section



1 thin | 3 medium | 5 thick

The pith in cross section should be observed half way between base of ear and stem node below.

Ad. 24: Ear: density

Ear density can be determined by counting the number of spikelets and then dividing the number by the ear length. The higher ratio will indicate a higher density.

3 lax | 5 medium | 7 dense

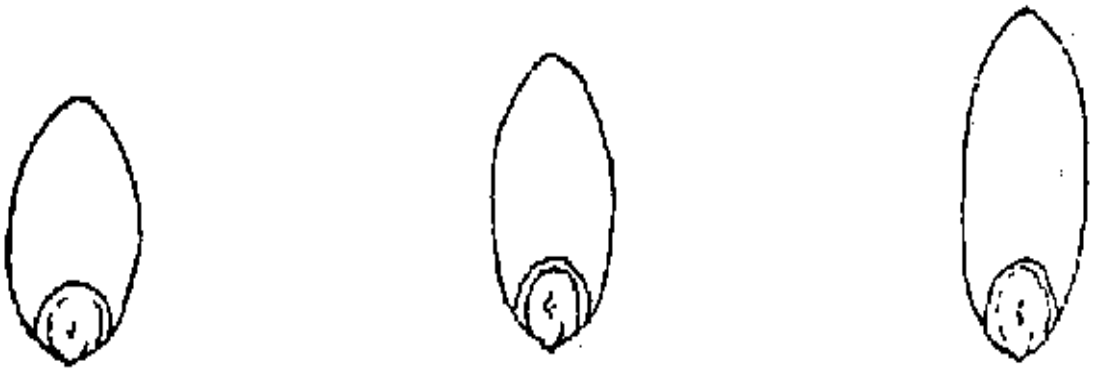
Ad. 25: Grain: length of brush hair

Observations should be made with a hand lens (x10 magnification). Brush hair length is viewed from the top of the grain on the dorsal side and can be described in the following ways:

1	3	5
short	medium	long

Ad. 26: Grain: shape

To be observed in dorsal view.



1	2	3
slightly elongated	moderately elongated	strongly elongated

Ad. 27: Grain: coloration with phenol

Method for Determination of Phenol Reaction

Number of grains per test	100 grains for distinctness and uniformity. The grains should not have been treated chemically.
Equipment	Petri dishes (approx. 9 cm diameter).
Preparation of grains	Soak in tap water for 16 to 20 hours, drain and remove surface water, place the grains with crease downwards, cover dish with lid.

Concentration of solution	1 per cent Phenol-solution (freshly made up).
Amount of solution	The grains should be about 3/4 covered.
Place	Laboratory
Light	Daylight - out of direct sunshine.
Temperature	18 to 20°C.
Time of recording	4 hours (after adding solution).
Scale of recording	See characteristic 27 in the Table of Characteristics.

Ad. 28: Plant: seasonal type

The seasonal type should be assessed on one or several plots sown in springtime. At the time when the latest spring type variety is fully mature (growth stage 91/92 of the Zadoks decimal code), the growth stage reached by the respective variety should be assessed. The states of expression are defined as follows:

Winter type: The plants have not exceeded stage 45 of the Zadoks decimal code (boots swollen).

Alternative type: The plants have exceeded stage 45 of the Zadoks decimal code --- as a rule they have exceeded stage 75 --- and have not exceeded stage 90.

Spring type: The plants have exceeded stage 90 of the Zadoks decimal code.

8.3 The descriptions of the growth stages of the Zadoks decimal code for cereals (Zadoks et al., 1974)

Zadoks Decimal code	**Description**
00	Dry seed
01	Start of imbibition
03	Imbibition complete
05	Radicle emerged from seed
07	Coleoptile emerged from seed
09	Leaf just at coleoptile tip
10	First leaf through coleoptile
11	First leaf unfolded
12	2 leaves unfolded
13	3 leaves unfolded
14	4 leaves unfolded
15	5 leaves unfolded
16	6 leaves unfolded
17	7 leaves unfolded
18	8 leaves unfolded
19	9 or more leaves unfolded
20	Main shoot only
21	Main shoot and 1 tiller
22	Main shoot and 2 tillers
23	Main shoot and 3 tillers
24	Main shoot and 4 tillers
25	Main shoot and 5 tillers
26	Main shoot and 6 tillers
27	Main shoot and 7 tillers
28	Main shoot and 8 tillers
29	Main shoot and 9 or more tillers
30	Pseudo stem erection
31	1st node detectable
32	2nd node detectable
33	3rd node detectable
34	4th node detectable
35	5th node detectable
36	6th node detectable
37	Flag leaf just visible
39	Flag leaf ligule/collar just visible
40	-
41	Flag leaf sheath extending
45	Boots just swollen
47	Flag leaf sheath opening
49	First awns visible
50	First spikelet of inflorescence visible
53	1/4 of inflorescence emerged
55	1/2 of inflorescence emerged
57	3/4 of inflorescence emerged
59	Emergence of inflorescence completed
60	Beginning on anthesis
65	Anthesis half-way
69	Anthesis completed
70	-
71	Kernel watery ripe
73	Early milk
75	Medium milk
77	Late milk
80	-
83	Early dough
85	Soft dough
87	Hard dough
90	-
91	Kernel hard (difficult to divide with thumbnail)
92	Kernel hard (no longer dented with thumbnail)
93	Kernel loosening in daytime
94	Overripe, straw dead and collapsing
95	Seed dormant
96	Viable seed giving 50% germination
97	Seed not dormant
98	Secondary dormancy induced
99	Secondary dormancy lost

9. Literature

Annicchiarico, P., Pecetti, L., 1994: Morpho-physiological traits as descriptors for discrimination of durum wheat germplasm. Genetic Resources and Crop Evoluation. Kluwer Academic Publishers. NL, 41: 47-54.

Fitzsimmons, R.W., Martin, R.H., Roberts, G.l., Wrigley, C.W., 1986: Australian Cereal Identification. Commonwealth Scientific and Industrial Research Organization. East Melbourne, AU.

Zadoks, J.C., Chang, T.T., Konzak, C.F., 1974: A Decimal Code for the Growth Stages of Cereals. Weed Research. NL, 14: 415-421.

Sparks, G.A., Bezar, H.J., Lamberrts, R., 1987: Identification of New Zealand Wheat Cultivars. Crop Research Division, DISR. Christchurch, NZ.

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

	Application date: (not to be filled in by the applicant)

TECHNICAL QUESTIONNAIRE
to be completed in connection with an application for plant breeders' rights

1. Subject of the Technical Questionnaire

1.1 Botanical name	*Triticum turgidum* L. subsp. *durum* (Desf.) Husn.
1.2 Common name	Durum Wheat

2. Applicant

Name	
Address	
Telephone No.	
Fax No.	
E-mail address	
Breeder (if different from applicant)	

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

[#]4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]
(please state parent varieties)

(……..……..…) x (……..……..…)
female parent male parent

(b) partially known cross [ ]
(please state known parent variety(ies))

(……..……..…) x (……..……..…)
female parent male parent

(c) unknown cross [ ]

4.1.2 Mutation [ ]
(please state parent variety)

4.1.3 Discovery and development [ ]
(please state where and when discovered and how developed)

4.1.4 Other [ ]
(please provide details)

[#] Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Self-pollination [ ]

(b) Hybrid [ ]

(c) Other [ ]
(please provide details)

4.2.2 Other [ ]
(please provide details)

In the case of hybrid varieties the production scheme for the hybrid should be provided on a separate sheet. This should provide details of all the parent lines required for propagating the hybrid e.g.

Single Hybrid

(……..……..…) x (……..……..…)
female parent male parent

Three-Way Hybrid

(……..……..…) x (……..……..…)
female parent male parent

(……..……..…) x (……..……..…)
female parent male parent

and should identify in particular:

(a) any male sterile lines
(b) maintenance system of male sterile lines.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).

	Characteristics	Example Varieties	Note
5.1 (19)	**Lower glume: hairiness of external surface**		
	absent	Don Sebastian, Grandur, Hyperno, Roqueño	1[ ]
	present	Don Jose, Paramo, Wollaroi	9[ ]
5.2 (20)	**Straw: pith in cross section**		
	thin	Hyperno, Valnova	1[ ]
	thin to medium		2[ ]
	medium	Tamaroi	3[ ]
	medium to thick		4[ ]
	thick	line4210.23.6, Paramo	5[ ]
5.3 (21)	**Awn: color**		
	white	Don Sebastian, Kronos	1[ ]
	light brown	Kamailaroi, Yallaroi	2[ ]
	medium purple	line4210.23.6, Tejon	3[ ]
	dark purple	Capdur, Don Jose, Tamaroi, Valnova	4[ ]
5.4 (23)	**Ear: coloration**		
	white	Don Jose, Valdur, Yallaroi	1[ ]
	slightly colored	Randur	2[ ]
	strongly colored	Kronos, Tamaroi	3[ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

	Characteristics	Example Varieties	Note
5.5 (27)	**Grain: coloration with phenol**		
	absent or very light	Don Jose, Hyperno	1[ ]
	very light to light		2[ ]
	light		3[ ]
	light to medium		4[ ]
	medium	Burgos, Randur	5[ ]
	medium to dark		6[ ]
	darl		7[ ]
	dark to very dark		8[ ]
	very dark		9[ ]
5.7 (28)	**Plant: seasonal type**		
	winter type		1[ ]
	alternative type	Valmora	2[ ]
	spring type	Kalka, Saintly	3[ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

6. Similar varieties and differences from these varieties

Please use the following table and box for comments to provide information on how your candidate variety differs from the variety (or varieties) which, to the best of your knowledge, is (or are) most similar. This information may help the examination authority to conduct its examination of distinctness in a more efficient way.

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the **similar** variety(ies)	Describe the expression of the characteristic(s) for **your** candidate variety
Example	*Ear: color at maturity*	*white*	*strongly colored*

Comments:

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

[#]7. Additional information which may help in the examination of the variety

7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?

Yes [ ] No [ ]

(If yes, please provide details)

7.2 Are there any special conditions for growing the variety or conducting the examination?

Yes [ ] No [ ]

(If yes, please provide details)

8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

If the answer to (b) is yes, please attach a copy of the authorization.

[#] Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

9. Information on plant material to be examined or submitted for examination.

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) Yes [ ] No [ ]

(b) Chemical treatment (e.g. growth retardant, pesticide) Yes [ ] No [ ]

(c) Tissue culture Yes [ ] No [ ]

(d) Other factors Yes [ ] No [ ]

Please provide details for where you have indicated “yes”.

……

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant’s name

Signature Date

[End of document]