TG/PISTA(proj.4)
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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

PISTACHIO

UPOV Code(s): PISTA_VER

Pistacia vera L.

and its hybrids

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from European Union
to be considered by the
Technical Working Party for Fruit Crops
at its fifty-first session, to be held in Nîmes, France,
from 2020-07-06 to 2020-07-10

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Pistacia vera L.	Pistachio, Green-almond, Pistache	Pistachier	Echte Pistazie, Pistazie, Pistazienbaum	Alfónsigo, Pistachero

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 *Pistacia vera* L. and its hybrids.

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 plants on their own roots or grafted plants on a rootstock specified by the testing authority.

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

5 plants on their own roots or,
5 plants on a rootstock specified by the testing authority.

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

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

3.1.2 For female varieties the minimum duration of tests should normally be two independent growing cycles.

The two independent growing cycles may be observed from a single planting, examined in two separate growing cycles.

3.1.3 For male varieties the minimum duration of tests is one observation cycle provided there is sufficient flowering.

3.1.4 In particular, it is essential that the plants of female varieties produce a satisfactory crop of fruit in each of the two growing cycles.

3.1.5 The testing of a variety may be concluded when the competent authority can determine with certainty the outcome of the test.

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 For female varieties, the competent authority should ensure that an appropriate male variety is available for adequate pollination.

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 5 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.

3.5 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 or Parts of Plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 5 plants or parts of plants taken from each of 5 plants and any other observations made on all plants in the test, disregarding any off-type plants.

In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be 6.

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 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 These Test Guidelines have been developed for the examination of vegetatively propagated varieties. For varieties with other types of propagation, the recommendations in the General Introduction and document TGP/13 "Guidance for new types and species" Section 4.5 "Testing Uniformity" should be followed.

4.2.3 For the assessment of uniformity of vegetatively propagated varieties, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 5 plants, no off-types are allowed.

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 plant stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

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

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

5.3 The following have been agreed as useful grouping characteristics:

(a) Plant: sex (characteristic 1)
(b) Plant: growth habit (characteristic 3)
(c) Terminal leaflet: shape of apex (characteristic 12)
(d) Nut: shape in lateral view (characteristic 24)
(e) Time of beginning of vegetative bud burst (characteristic 35)
(f) Time of beginning of flowering (characteristic 36)
(g) Time of maturity for harvest (characteristic 37)

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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1 2	**3 4**	**5 6**	**7**			
	Name of characteristics in English	**Nom du caractère en français**	**Name des Merkmals auf Deutsch**	**Nombre del carácter en español**		
	states of expression	types d’expression	Ausprägungsstufen	tipos de expresión		

1 Characteristic number

2 (*) Asterisked characteristic – see Chapter 6.1.2

3 Type of expression
QL Qualitative characteristic – see Chapter 6.3
QN Quantitative characteristic – see Chapter 6.3
PQ Pseudo-qualitative characteristic – see Chapter 6.3

4 Method of observation (and type of plot, if applicable)
MG, MS, VG, VS – see Chapter 4.1.5

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

6 (a)-(f) See Explanations on the Table of Characteristics in Chapter 8.1

7 Not applicable

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.	**(*)**	**QL VG**					
		Plant: sex					
		female				Kerman (f), Larnaka (f)	1
		male				Peters (m), Randy (m)	2
2.	**(*)**	**QN VG**	**(+)** **(a)**				
		Plant: vigor					
		very weak				Avidon (f), Bronte (f)	1
		medium				Kerman (f)	2
		very strong				Boundoky (f), Mateur (f)	3
3.	**(*)**	**PQ VG**	**(a)**				
		Plant: growth habit					
		upright				Ouleimy (f)	1
		spreading				Larnaka (f)	2
		drooping				Insolia (f), Joley (f)	3
4.	**(*)**	**QN VG**	**(+)**				
		Plant: density of canopy					
		sparse				Mateur (f)	1
		medium				Kerman (f)	2
		dense					3
5.		**QN VG**					
		Young shoot: intensity of anthocyanin coloration of growing tip					
		absent or very weak				Mateur (f)	1
		weak				Chico (m), Randy (m)	2
		medium				Enk (m), Napoletana (f)	3
		strong				Cerasola (f)	4
		very strong				40A (m)	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6.	**QN VG**	**(b)**				
	Leaf: intensity of green color of upper side					
	light				Napoletana (f)	1
	medium				502 (m), Larnaka (f)	2
	dark				Chico (m)	3
7.	**QN MG/MS/VG**	**(b), (e)**				
	Leaf: length of petiole					
	very short				Bronte (f)	1
	short				Ask (m), Sfax (f)	2
	medium				Greco (f), Mateur (f)	3
	long				Cerasola (f)	4
	very long				Chico (m), Enk (m), Lost Hills (f)	5
8.	**QN MG**	**(b)**				
	Leaf: predominant number of leaflets					
	less than 6				Aegina (f)	1
	from 6 to 10				Chico (m)	2
	more than 10				Enk (m)	3
9.	**QN MS/VG**	**(b), (e)**				
	Terminal leaflet: length					
	very short				40A (m), Golden Hills (f)	1
	very short to short				Enk (m)	2
	short					3
	short to medium				Lost Hills (f)	4
	medium				Chico (m)	5
	medium to long				Bronte (f), Napoletana (f)	6
	long				Aegina (f)	7
	long to very long				Cerasola (f), Larnaka (f)	8
	very long					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
10.		**QN MS/VG**	**(b), (e)**				
		Terminal leaflet: width					
		very narrow				Enk (m), Golden Hills (f)	1
		very narrow to narrow				40A (m)	2
		narrow					3
		narrow to medium				Chico (m)	4
		medium				Lost Hills (f)	5
		medium to broad				Napoletana (f)	6
		broad				Greco (f)	7
		broad to very broad				Aegina (f)	8
		very broad				Larnaka (f)	9
11.		**QN MS/VG**	**(b)**				
		Terminal leaflet: ratio length/width					
		very low				Mateur (f)	1
		very low to low					2
		low					3
		low to medium				Kerman (f)	4
		medium				Chico (m), Napoletana (f)	5
		medium to high				Lost Hills (f)	6
		high				Golden Hills (f)	7
		high to very high				Larnaka (f)	8
		very high				Enk (m), Sfax (f)	9
12.	**(*)**	**PQ VG**	**(+) (b)**				
		Terminal leaflet: shape of apex					
		acute				Enk (m), Mateur (f)	1
		obtuse					2
		rounded				Golden Hills (f)	3
		truncate				Insolia (f)	4
		obcordate					5
13.	**(*)**	**PQ VG**	**(+) (b)**				
		Terminal leaflet: shape of base					
		acute				Aegina (f)	1
		rounded				Lost Hills (f)	2
		truncate					3

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14.		**QN**	**VG**	**(+)**	**(b)**				
		Terminal leaflet: asymmetry at base							
		absent or weak						Lost Hills (f)	1
		medium						Aegina (f)	2
		strong							3
15.		**PQ**	**VG**		**(c)**				
		Female inflorescence: bud shape							
		ovate						Sfax (f)	1
		circular						Chico (m)	2
		elliptic						Aegina (f)	3
16.		**PQ**	**VG**		**(c)**				
		Female inflorescence: bud color							
		light brown						Bronte (f)	1
		medium brown						Aegina (f)	2
		dark brown						Rashti (f)	3
		reddish brown						Mateur (f)	4
17.		**QN**	**VG**	**(+)**	**(d), (f)**				
		Hull: dehiscence							
		weak						Kerman (f), Napoletana (f)	1
		medium						Mateur (f)	2
		strong						Avidon (f), Larnaka (f)	3
18.	**(*)**	**QN**	**VG**		**(d), (f)**				
		Hull: prominence of tip							
		absent or weak						Kerman (f), Sfax (f)	1
		medium						Cerasola (f)	2
		strong						Aegina (f), Joley (f), Larnaka (f)	3
19.		**PQ**	**VG**	**(+)**	**(d), (f)**				
		Hull: ground color							
		green white						Aegina (f)	1
		yellow green						Kastel (f)	2
		yellow						Sfax (f)	3
		yellow orange						Larnaka (f)	4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
20.		**QN VG**	**(+) (d), (f)**				
		Hull: area of over color					
		absent or very small				Sfax (f)	1
		small					2
		medium				Kerman (f)	3
		large					4
		very large				Aegina (f), Cerasola (f)	5
21.	**(*)**	**QN MS/VG**	**(+) (d), (f)**				
		Nut: length					
		very short				Bronte (f), Sfax (f)	1
		short					2
		medium				Mateur (f)	3
		long					4
		very long				Ouleimy (f)	5
22.	**(*)**	**QN MS/VG**	**(+) (d)**				
		Nut: width in lateral view					
		very narrow					1
		narrow					2
		medium				Cerasola (f)	3
		broad					4
		very broad				Kerman (f)	5
23.	**(*)**	**QN MS/VG**	**(+) (d)**				
		Nut: width in ventral view					
		narrow				Aegina (f)	1
		medium				Cerasola (f)	2
		broad				Ouleimy (f)	3
24.	**(*)**	**PQ VG**	**(d)**				
		Nut: shape in lateral view					
		broad elliptic				Sfax (f)	1
		narrow elliptic					2
		ovate				Kerman (f)	3

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
25.	**(*)**	**PQ**	**VG**		**(d)**				
		Nut: shape of apex in lateral view							
		acute						Aegina (f), Larnaka (f)	1
		rounded						Bronte (f)	2
		truncate						Sfax (f)	3
26.	**(*)**	**QL**	**VG**	**(+)**	**(d)**				
		Nut: presence of tip							
		absent						Kerman (f)	1
		present						Larnaka (f)	9
27.		**QN**	**VG**	**(+)**	**(d)**				
		Nut: depression of shell near pedicel							
		absent or shallow							1
		medium						Mateur (f)	2
		deep						Kerman (f)	3
28.		**QN**	**VG**		**(d)**				
		Nut: intensity of brown color of the shell							
		very light						Kerman (f)	1
		light						Aegina (f)	2
		medium						Sirora (f)	3
		dark						Larnaka (f)	4
		very dark						Avidon (f)	5
29.		**QN**	**VG**		**(d)**				
		Nut: position of suture opening							
		mainly dorsal side							1
		equally dorsal and ventral side						Kerman (f)	2
		mainly ventral side						Larnaka (f)	3

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
30.		**QN**	**VG**		**(d)**				
		Nut: width of suture opening							
		narrow						Bronte (f)	1
		medium						Mateur (f)	2
		broad						Aegina (f)	3
31.		**QL**	**VG**		**(d)**				
		Nut: position of pedicel scar in ventral view							
		symmetric							1
		asymmetric						Avdat (f)	2
32.		**QN**	**VG**	**(+)**	**(d)**				
		Nut: shell staining							
		low						Aegina (f)	1
		medium						Larnaka (f)	2
		high							3
33.	**(*)**	**QN**	**MG**	**(+)**	**(d), (f)**				
		Kernel: weight							
		low						Avidon (f), Sfax (f)	1
		low to medium							2
		medium						Larnaka (f), Mateur (f)	3
		medium to high							4
		high						Kastel (f), Kerman (f)	5
34.		**QN**	**VG**		**(d), (f)**				
		Cotyledon: intensity of green color							
		light						Kerman (f), Lost Hills (f), Rashti (f)	1
		medium						Avidon (f), Sfax (f)	2
		dark						Larnaka (f), Ouleimy (f)	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
35.	**(*) QN MG/VG**	**(+)**				
	Time of beginning of vegetative bud burst					
	very early				Aegina (f), Chico (m)	1
	early				Larnaka (f)	2
	medium				Ask (m), Bronte (f)	3
	late				Joley (f)	4
	very late				Kerman (f), Peters (m)	5
36.	**(*) QN MG/VG**	**(+)**				
	Time of beginning of flowering					
	very early				Avidon (f), Mateur (f)	1
	early				Larnaka (f)	2
	medium				02-18 (m), M-38 (m), Sfax (f)	3
	late				Kastel (f)	4
	very late				Kerman (f), Peters (m)	5
37.	**(*) QN MG/VG**	**(+)**				
	Time of maturity for harvest					
	very early				Avidon (f)	1
	early				Golden Hills (f)	2
	medium				Napoletana (f)	3
	late					4
	very late				Kerman (f)	5

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

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

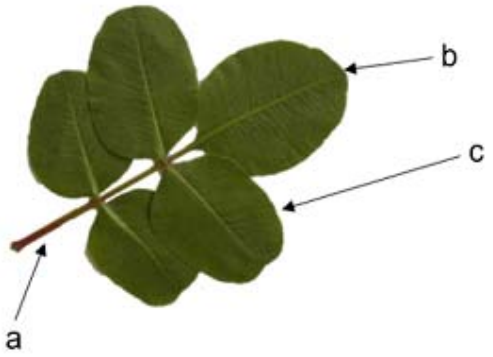
(a) Observations should be made in the dormant season.

(b) Observations should be made on fully developed leaves from the middle third of current season shoots.

(c) Observations should be done on fully grown trees of fruiting female and hermaphrodite varieties.

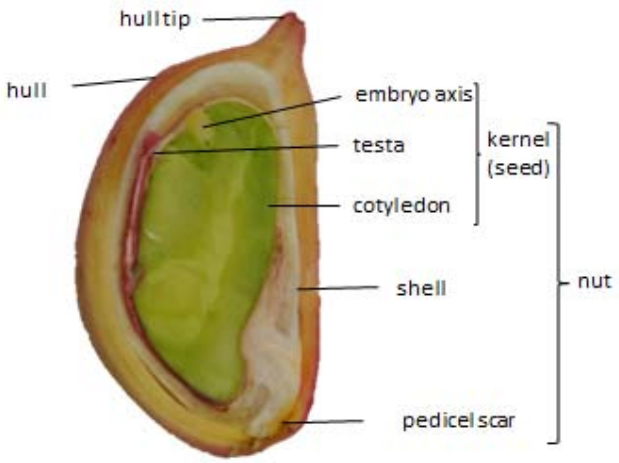
(d) Observations should be done on fully grown trees of fruiting female and hermaphrodite varieties. Observations of the fruit should be made on 100 fruits taken from a minimum sample of 200 fruits, at time of visual ripeness.

(e)



a = Petiole
b = Terminal leaflet
c = Lateral leaflet

(f)



8.2 Explanations for individual characteristics

Ad. 2: Plant: vigor

The vigor of the plant should be considered as the overall abundance of vegetative growth.

Ad. 4: Plant: density of canopy

The density of canopy of the plant should be considered as the overall abundance of branches during the dormant period.

Ad. 12: Terminal leaflet: shape of apex

1 acute | 2 obtuse | 3 rounded | 4 truncate | 5 obcordate

Ad. 13: Terminal leaflet: shape of base

1 acute | 2 rounded | 3 truncate

Ad. 14: Terminal leaflet: asymmetry at base

1 absent or weak | 2 medium | 3 strong

Ad. 17: Hull: dehiscence

Hull dehiscence should be assessed as the degree of separation of the hull from the shell. It is assessed by visual inspection of the fruit and exercising pressure with fingers:

1 - absent or weak - it is difficult to separate hull from the nut when pressing with fingers,
2 - medium - hull separates easy from the nut, a layer of air between the hull and nut can be detected when pressing with fingers,
3 - strong - there are visible cracks on the hull and the hull separates very easy from the nut when pressing with fingers,.

Ad. 19: Hull: ground color

The ground color is the first color to appear chronologically during the development of the fruit.

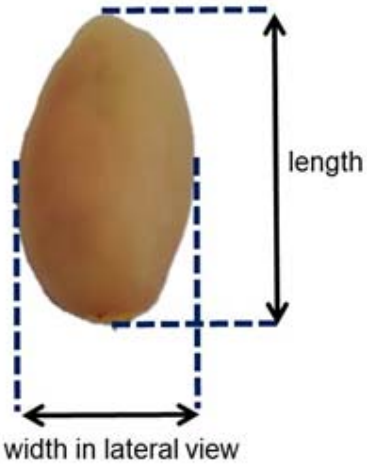
Ad. 20: Hull: area of over color

1
absent or very small

3
medium

5
large

Ad. 21: Nut: length



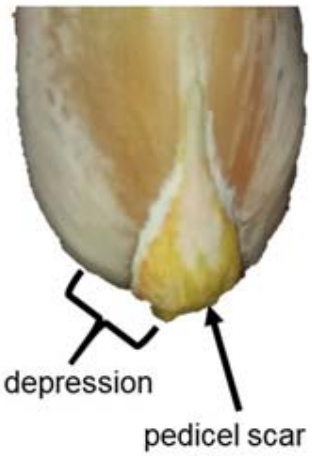
Ad. 22: Nut: width in lateral view

See Ad. 21

Ad. 23: Nut: width in ventral view

Ad. 26: Nut: presence of tip

Ad. 27: Nut: depression of shell near pedicel



Ad. 32: Nut: shell staining

The shell staining should be assessed after drying.

Ad. 33: Kernel: weight

Crack 20 nuts at maturity for harvest and assess the average weight of the kernels.

Ad. 35: Time of beginning of vegetative bud burst

The time of beginning of vegetative burst should be considered when 10% of terminal buds have enlarged and the bud scales have split showing the green of the leaves.

Ad. 36: Time of beginning of flowering

The time of beginning of flowering should be considered:
- for female and hermaphrodite varieties - the time when 25% of flower buds are receptive for pollination,
- for male varieties - the time when flowers start spreading pollen.

Ad. 37: Time of maturity for harvest

The time of maturity for harvest should be considered when at least 50% of fruits are mature.

9. Literature

Couceiro, J.F.; Guerrero, J., Gijón MC., Pérez-López, D.; Moriana, A. and Rodriguez, M. 2013: El Cultivo del Pistacho. Ediciones Mundi-Prensa. Madrid, Spain.

Ferguson, L., Polito, V., Kallsen, C., The pistachio tree; botany and physiology and factors that affect yield. http://fruitsandnuts.ucdavis.edu/files/73683.pdf, pp. 31 to 39.

IPGRI, 1997: Descriptors for Pistachio (*Pistacia vera* L.). International Plant Genetic Resources Institute, Rome, Italy.

Padulosi, S., Hadj-Hassan, A. editors, 2001: Project on Underutilized Mediterranean Species. Pistacia: towards a comprehensive documentation of distribution and use of its genetic diversity in Central & West Asia, North Africa and Mediterranean Europe. Report of the IPGRI Workshop, 14-17 December 1998, Irbid, Jordan.

Kafkas, S., Kafkas, E., Perl-Treves R., 2002: Morphological diversity and a germplasm survey of three wild Pistacia species in Turkey. Genetic Resources and Crop Evolution 49, pp. 261 to 270.

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	*Pistacia vera* L.
1.2 Common name	Pistachio, Green-almond, Pistache

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

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 Vegetative propagation

(a) Cuttings [ ]
(b) *In vitro* propagation [ ]
(c) Budding or grafting [ ]
(d) Other (state method) [ ]

4.2.2 Other [ ]
(Please provide details)

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 (1)	**Plant: sex**		
	female	Kerman (f), Larnaka (f)	1 [ ]
	male	Peters (m), Randy (m)	2 [ ]
5.2 (3)	**Plant: growth habit**		
	upright	Ouleimy (f)	1 [ ]
	spreading	Larnaka (f)	2 [ ]
	drooping	Insolia (f), Joley (f)	3 [ ]
5.3 (12)	**Terminal leaflet: shape of apex**		
	acute	Enk (m), Mateur (f)	1 [ ]
	obtuse		2 [ ]
	rounded	Golden Hills (f)	3 [ ]
	truncate	Insolia (f)	4 [ ]
	obcordate		5 [ ]
5.4 (24)	**Nut: shape in lateral view**		
	broad elliptic	Sfax (f)	1 [ ]
	narrow elliptic		2 [ ]
	ovate	Kerman (f)	3 [ ]
5.5 (35)	**Time of beginning of vegetative bud burst**		
	very early	Aegina (f), Chico (m)	1 [ ]
	early	Larnaka (f)	2 [ ]
	medium	Ask (m), Bronte (f)	3 [ ]
	late	Joley (f)	4 [ ]
	very late	Kerman (f), Peters (m)	5 [ ]

	Characteristics	Example Varieties	Note
5.6 (36)	**Time of beginning of flowering**		
	very early	Avidon (f), Mateur (f)	1 [ ]
	early	Larnaka (f)	2 [ ]
	medium	02-18 (m), M-38 (m), Sfax (f)	3 [ ]
	late	Kastel (f)	4 [ ]
	very late	Kerman (f), Peters (m)	5 [ ]
5.7 (37)	**Time of maturity for harvest**		
	very early	Avidon (f)	1 [ ]
	early	Golden Hills (f)	2 [ ]
	medium	Napoletana (f)	3 [ ]
	late		4 [ ]
	very late	Kerman (f)	5 [ ]

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	Characteristic(s) in which your candidate variety differs	Describe the expression of the characteristic(s) for the	Describe the expression of the characteristic(s) for **your**
Example	*Plant: growth habit*	*spreading*	*drooping*

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)

7.3 Other information

A representative color photograph of the variety displaying its main distinguishing feature(s), should accompany the Technical Questionnaire. The photograph will provide a visual illustration of the candidate variety which supplements the information provided in the Technical Questionnaire.

The key points to consider when taking a photograph of the candidate variety are:

- Indication of the date and geographic location
- Correct labeling (breeder's reference)
- Good quality printed photograph (minimum 10 cm x 15 cm) and/or sufficient resolution electronic format version (minimum 960 x 1280 pixels)"

Further guidance on providing photographs with the Technical Questionnaire is available in document TGP/7 "Development of Test Guidelines", Guidance Note 35 (http://www.upov.int/tgp/en/).

[The link provided may be deleted by members of the Union when developing authorities' own test guidelines.]

Any frost requirements or chilling hour requirements for the correct development of plant material of the candidate variety in the DUS trial field:

Please specify:

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:

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.

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”.

.....

9.3 Has the plant material to be examined been tested for the presence of virus or other pathogens?

Yes [ ]

(please provide details as specified by the Authority)

No [ ]

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]