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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

PECAN NUT

UPOV Code: CARYA_ILL

Carya illinoinensis (Wangenh.) K. Koch

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from Mexico

to be considered by the

Technical Working Party for Fruit Crops
at its forty-fifth session, to be held in Marrakesh, Morocco, from May 26 to 30, 2014

Disclaimer: this document does not represent UPOV policies or guidance

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Carya illinoinensis (Wangenh.) K. Koch	Pecan nut	Noix de pécan	Pekan, Pekannuss	Nuez pecán, Pecan, Nogal pecanero

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 *Carya illinoinensis* (Wangenh.) K. Koch.

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 dormant budsticks or grafted plants.

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

8 dormant budsticks or 8 grafted plants.

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 The growing cycle is considered to be the period ranging from the beginning of active vegetative growth or flowering, continuing through active vegetative growth or flowering and fruit development and concluding with the harvesting of fruit.

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

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

3.4 Test Design

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

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 / Parts of Plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations should be made on 5 plants or parts taken from each of 5 plants. In the case of observations of parts of plants, the number of parts to be taken from each of the plants should be 2.

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 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 trees, no off-type is 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) Tree: vigor (characteristic 1)
(b) Tree: growth habit (characteristic 3)
(c) Lateral leaflet: presence of petiolule (characteristic 11)
(d) Nut: length (characteristic 19)
(e) Nut: width in lateral view (characteristic 20)
(f) Nut: width in ventral view (characteristic 21)
(g) Nut: shape in lateral view (characteristic 23)

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)-(c) See Explanations on the Table of Characteristics in Chapter 8.1

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

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. **(*)** **(+)**	**VG**	**Tree: vigor**					
QN		weak				Barton, Success	3
		medium				Cheyenne	5
		strong				Desirable, Western	7
2. **(+)**	**VG**	**Tree: density of canopy**					
QN		sparse				Cheyenne	3
		medium				Desirable, Mahan	5
		dense				Success, Wichita	7
3. **(*)** **(+)**	**VG**	**Tree: growth habit**					
QN		upright				Success	1
		semi-upright				Desirable, Mohawk	2
		spreading				Shoshoni, Western	3
4.	**VG**	**One-year-old shoot: color**					
PQ		greenish brown				Stuart	1
		medium brown				Mahan	2
		brown				Desirable, Success	3
5.	**VG**	**Leaf: intensity of green color**					
QN	**(a)**	light				Desirable	1
		medium				Stuart	2
		dark					3
6. **(+)**	**VG/ MS**	**Leaf: length of terminal leaflet**					
QN	**(a)**	short				Desirable	3
		medium				Shoshoni, Stuart	5
		long				Mahan	7
7. **(+)**	**VG/ MS**	**Leaf: width of terminal leaflet**					
QN	**(a)**	narrow				Desirable	3
		medium				Success	5
		broad					7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
8. **(+)**	**VG/ MS**	**Leaf: ratio length/width of terminal leaflet**					
QN	**(a)**	low				Desirable	3
		medium				Shoshoni	5
		high				Mahan, Stuart	7
9. **(+)**	**VG/ MG**	**Leaf: length of petiole**					
QN	**(a)**	short				Desirable	3
		medium				Success	5
		long				Mahan, Stuart	7
10. **(+)**	**VG**	**Lateral leaflet: curvature along longitudinal axis**					
QN	**(a)**	weak				Desirable	1
		medium					2
		strong				Mahan	3
11. **(*)** **(+)**	**VG**	**Lateral leaflet: presence of petiolule**					
QL	**(a)**	absent				Desirable	1
		present				Stuart, Success	9
12. **(+)**	**VG**	**Lateral leaflet: asymmetry at base**					
QN	**(a)**	absent or weak				Desirable	1
		moderate					2
		strong					3
13. **(*)** **(+)**	**VG/ MG**	**Catkin: length**					
QN		short				Desirable	3
		medium				Mahan, Stuart	5
		long					7
14.	**VG/ MS**	**Female inflorescence: number of flowers**					
QN		very few					1
		few				Success	2
		medium				Cape Fear, Harris Super, Stuart	3
		many				Mahan	4
		very many					5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
15.	**VG**	**Stigma: splitting**					
(+)							
QN	**(b)**	absent or weak				INTA DELTA II, Mahan	1
		moderate					2
		strong				Cape Fear, Desirable, Stuart	3
16. **(*)**	**VG**	**Stigma: anthocyanin coloration**					
QN	**(b)**	absent or weak				INTA DELTA II, Mahan	1
		medium				Desirable, Success	2
		strong				Shoshoni	3
17.	**VG**	**Husk: intensity of green color**					
QN		light				Shoshoni	1
		medium				Desirable	2
		dark					3
18. **(*)** **(+)**	**VG**	**Husk: prominence of ribs**					
QN		absent or very weak					1
		weak				Shoshoni	3
		medium					5
		strong					7
19. **(*)** **(+)**	**VG/ MS**	**Nut: length**					
QN	**(c)**	short				Desirable, Success	3
		medium				Harris Super, Stuart	5
		long				Mahan	7
20. **(*)** **(+)**	**VG/ MS**	**Nut: width in lateral view**					
QN	**(c)**	narrow				Desirable, Kernodle, Mahan	3
		medium				Stuart	5
		broad				Shoshoni	7
21. **(*)** **(+)**	**VG/ MS**	**Nut: width in ventral view**					
QN	**(c)**	narrow				Mahan	3
		medium				Stuart	5
		broad				Shoshoni	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
22. **(*)** **(+)**	**VG**	**Nut: shape in ventral view**					
PQ	**(c)**	circular				Major	1
		elliptic				Kanza	2
		oblong				Harris Super, Mahan, Maramec	3
		obovate				Chetopa	4
		ovate				Curtis	5
23. **(+)**	**VG**	**Nut: shape in lateral view**					
PQ	**(c)**	circular					1
		elliptic				Candy, Chickasaw	2
		oblong				Curtis, Harris Super, Mahan	3
		obovate				Western Schley	4
		ovate				Amling, Cheyenne, Elliot	5
24. **(+)**	**VG**	**Nut: shape in cross section**					
QN		narrow oblate					1
		medium oblate				Kernodle	2
		circular				Desirable, Shoshoni	3
25. **(*)** **(+)**	**VG**	**Nut: shape of apex in lateral view**					
PQ		rounded				Major	1
		obtuse				Success	2
		acute				Desirable, Stuart	3
26. **(*)** **(+)**	**VG/** **MS**	**Nut: length of tip**					
QN		absent or short				Major	1
		medium				Chetopa	2
		long				Curtis, Mahan, Sioux	3
27. **(+)**	**VG**	**Nut: ground color**					
PQ		grey brown				Barton	1
		light brown				Desirable, Mahan, Success	2
		medium brown				Harris Super, Stuart	3
		dark brown				Kernodle, Shoshoni	4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
28.	**VG**	**Nut: area covered by spots**					
QN		small				Desirable, Harris Super, Kernodle	3
		medium				Mahan	5
		large				Stuart	7
29. (*)	**VG/ MG**	**Nut: thickness of shell**					
QN		thin				Candy, Curtis, Hastings	1
		medium				Desirable, Stuart	2
		thick				Elliot, Moneymaker	3
30.	**VG**	**Kernel: adherence to shell**					
QN		weak				Jackson, Shoshoni	1
		medium				Melrose, Kiowa	2
		strong				Hastings, Stuart	3
31. (*) (+)	**MG**	**Kernel: weight**					
QN		light				Mahan	3
		medium				Pawnee	5
		heavy				Wichita	7
32.	**VG**	**Kernel: intensity of brown color**					
QN		light				Desirable	1
		medium				Pawnee	2
		dark				Stuart	3
33.	**VG**	**Time of leaf bud burst**					
(+)							
QN		early				Woodroof	3
		medium				Curtis, Kernodle	5
		late				Stuart, Success	7
34.	**VG**	**Time of leaf fall**					
(+)							
QN		early				Dooley, Stuart	3
		medium				Colby	5
		late				Comanche, Woodroof	7
35. (+)	**VG/ MG**	**Time of husk opening**					
QN		early				Norton,	3
		medium				Elliot, Sioux	5
		late				Kernodle	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36. **(+)**	**VG**	**Tree: persistence of husk after nut fall**					
QN		not persistent				Success	1
		partially persistent					2
		fully persistent				Desirable, Stuart	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) Phenological state (V9) – end of leaflet expansion – fully developed leaflets. Leaves on the middle section of a one year old shoot.
(b) Phenological state (R6) – fully receptivity of stigma – Stigma is turgid and sticky. Observation must be done on the terminal section of a one year shoot.
(c) Phenological state (R14) – husk opening – 24 weeks after pollination. Full development of the nut. Observation must be done on the terminal section of a one year old shoot.

8.2 Explanations for individual characteristics

Ad. 1: Tree: vigor

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

Ad. 2: Tree: density of canopy

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

Ad. 3: Tree: growth habit

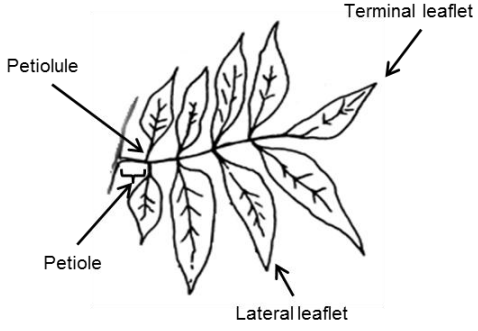
1
upright

2
semi-upright

3
spreading

Ad. 6: Leaf: length of terminal leaflet
Ad. 7: Leaf: width of terminal leaflet
Ad. 8: Leaf: ratio length/width of terminal leaflet
Ad. 9: Leaf: length of petiole
Ad. 10: Lateral leaflet: curvature along longitudinal axis
Ad. 11: Lateral leaflet: presence of petiolule
Ad. 12: Lateral leaflet: asymmetry at base

To observe on fully developed leaves on the middle third of branches growing in the current year.



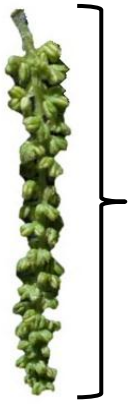
Ad. 12: Lateral leaflet: asymmetry at base

1
absent or weak

2
moderate

3
strong

Ad. 13: Catkin: length



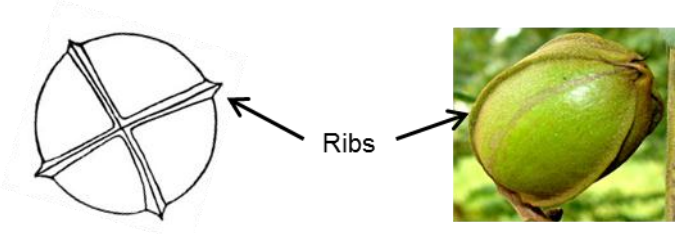
Ad. 15: Stigma: splitting

1
absent or weak

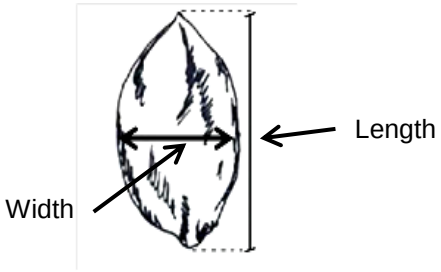
2
moderate

3
strong

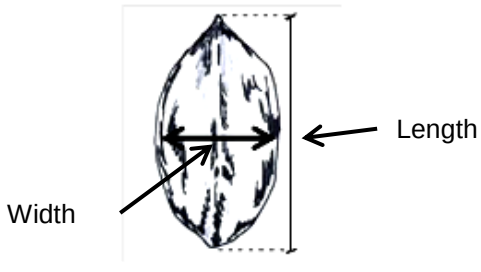
Ad. 18: Husk: prominence of ribs



Ad. 19: Nut: length
Ad. 20: Nut: width in lateral view
Ad. 21: Nut: width in ventral view



lateral view



ventral view

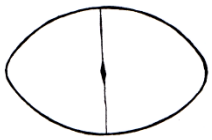
Ad. 22: Nut: shape in ventral view
Ad. 23: Nut: shape in lateral view

The grid are nuts in ventral view and the general outline shape should be considered for lateral view

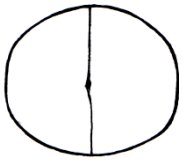
		< broadest part >			
		(below middle)	at middle		(above middle)
< lateral outline >	flat parallel sides		 3 oblong		
	rounded	 5 ovate	 2 elliptic	 1 circular	 4 obovate

Ad. 24: Nut: shape in cross section

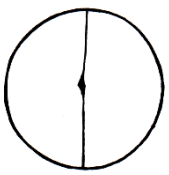
To be observed with suture in vertical position



1
narrow oblate



2
medium oblate



3
circular

Ad. 25: Nut: shape of apex in lateral view

1
rounded

2
obtuse

3
acute

Ad. 26: Nut: length of tip

1
absent or short

2
medium

3
long

Ad. 27: Nut: ground color

The color is observed on the surface of the nut, disregarding the spots.

Ad. 31: Kernel: weight

Crack 10 nuts that are ready for consumption and then remove and weight the kernels. Then take the average weight.

Ad. 33: Time of leaf bud burst

The time of leaf burst should be considered when 75% of the plant show bud burst.

Ad. 34: Time of leaf fall

The time of leaf fall should be considered when 75% of the plant has shed their leaves.

Ad. 35: Time of husk opening

Husk opening is when 75% of the husks are split in each of the 5 trees. Individual valves of the husk are separated to allow visibility of the nut.

Ad. 36: Tree: persistence of husk after nut fall

The persistence of the husk is its retention on the infrutescence on the shoot after the fall of the nuts. The observation is made during late winter.

8.3 Pecan nut phenological stages (Frusso, 2007)

V1: dormant bud
V2: inflated bud
V3: external splited bud
V4: internal splited bud
V5: developing leaves
V6 – V9: developing leaflets
R1: catkin prolonging
R2: pollen liberation (start, fullness and end)
R3: stigma receptivity (start, fullness and end)
R4: early nut development
R5: quick nut development
R6: late nut development
R7: starts the kernel fill
R8: kernel fill
R9: end of kernel fill
R10: opening husk
S1: yellowing leaves (start, fullness and end)
S2: downfall leaves (start, fullness and end)

9. Literature

Frusso, E., 1997: Aspectos del cultivo del nogal pecan, Estación Experimental Agropecuaria INTA Delta del Paraná (INTA), Buenos Aires, AR, pp. 11.

Frusso, E.A. 2007: Características morfológicas y fenológicas del pecán. En Lavado, R.S. y E.A. Frusso (Editores) La producción de pecán en Argentina. Buenos Aires. INTA-FAUBA. II: 1-18.

Instituto Nacional de Semillas (INASE), 2004: Descriptor morfológico, fisiológico, fenológico, para el registro y protección de cultivares de PECAN (*Carya illinoinensis* (Wangenh.) K. Koch), Buenos Aires, AR, pp. 11.

Grauke, L.J., 1985: The Scientific name of the pecan. HortScience 20: 629-630.

Grauke, L.J., Thompson, T., 1992: Patterns of pollination in pecans. Proc. Texas Pecan Growers 71: 41-49.

Grauke, L.J., Thompson, T., 1996: Pecan and hickories, Fruit Breeding.vol III , New York, US, pp 185-239.

Goff, W.D., Mc Vay J.R., Gazaway, W.S., 1996: Pecan: Production in the southeast – A guide for growers. Alabama Cooperative Extension System (Auburn University) Alabama, US, pp. 222.

Madero, E., Frusso E., Cajaravilla, P., 1997: La nuez pecan, Estación Experimental Agropecuaria INTA Delta del Paraná (INTA), Buenos Aires, AR, pp. 16.

Wesley Rice, G. ,1994: Pecans: popular varieties, propagation, culture & more, PecanQuest Publications, Ponca City, Oklahoma, US, pp.168.

Wood, B. W., 1996: Canopy morphology of pecan cultivars. HortScience 31: 139-142.

Wood, B. W., Smith, M.W., Worley, R.E., Anderson, P.C., Thompson, T.T., Grauke, L.J. 1997: Reproductive and vegetative characteristics of pecan cultivars. HortScience 32: 1028-1033.

Worley, R. E., Mullinixy, B. G. 1997. Pecan cultivar performance at the coastal plain experiment station 1921-1994.: The University of Georgia, Tifton, Georgia, US, pp. 34

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	*Carya illinoinensis* (Wangenh.) K Koch
1.2 Common name	Pecan Nut

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)	Cross-pollination	
	(i) population	[ ]
	(ii) synthetic variety	[ ]
(c)	Hybrid	[ ]
(d)	Other	[ ]
	(please provide details)	

4.2.1 Vegetative propagation

(a)	cuttings	[ ]
(b)	*in vitro* propagation	[ ]
(c)	grafting	
(d)	other (state method)	[ ]

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)	**Tree: vigor**		
	very weak		1[ ]
	very weak to weak		2[ ]
	weak	Barton, Success	3[ ]
	weak to medium		4[ ]
	medium	Cheyenne	5[ ]
	medium to strong		6[ ]
	strong	Desirable, Western	7[ ]
	strong to very strong		8[ ]
	very strong		9[ ]
5.2 (3)	**Tree: growth habit**		
	upright	Success	1[ ]
	semi-upright	Desirable, Mohawk	2[ ]
	spreading	Shoshoni, Western	3[ ]
5.3 (11)	**Lateral leflet: presence of petiolule**		
	absent	Desirable	1[ ]
	present	Stuart, Success	9[ ]
5.4 (19)	**Nut: length**		
	very short		1[ ]
	very short to short		2[ ]
	short	Desirable, Success	3[ ]
	short to medium		4[ ]
	medium	Harris Super, Stuart	5[ ]
	medium to long		6[ ]
	long	Mahan	7[ ]
	long to very long		8[ ]
	very long		9[ ]

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

	Characteristics	Example Varieties	Note
5.5 (20)	**Nut: width in lateral view**		
	very narrow		1[ ]
	very narrow to narrow		2[ ]
	narrow	Desirable, Kernoodle, Mahan	3[ ]
	narrow to medium		4[ ]
	medium	Stuart	5[ ]
	medium to broad		6[ ]
	broad	Shoshoni	7[ ]
	broad to very broad		8[ ]
	very broad		9[ ]
5.6 (21)	**Nut: width in ventral view**		
	very narrow		1[ ]
	very narrow to narrow		2[ ]
	narrow	Mahan	3[ ]
	narrow to medium		4[ ]
	medium	Stuart	5[ ]
	medium to broad		6[ ]
	broad	Shoshoni	7[ ]
	broad to very broad		8[ ]
	very broad		9[ ]
5.7 (23)	**Nut: shape in lateral view**		
	circular		1[ ]
	elliptic	Candy, Chickasaw	2[ ]
	oblong	Curtis, Harris Super, Mahan	3[ ]
	obovate	Western Schley	4[ ]
	ovate	Amling, Cheyenne, Elliot	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 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	*Kernel: intensity of brown color*	*light*	*dark*

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 image of the variety should accompany the Technical Questionnaire.

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]