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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

SAFFLOWER

UPOV Code(s): CARTH_TIN

Carthamus tinctorius L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

*prepared by experts from Germany
to be considered by the
Technical Working Party for Agricultural Crops
at its fifty-second session, to be held virtually
from 2023-05-22 to 2023-05-26*

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Carthamus tinctorius</i> L.	Safflower	Carthame	Saflor	Cártamo

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 *Carthamus tinctorius* L.

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:

500 g

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.

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 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*

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.

3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of at least 60 plants, which should be divided between at least 2 replicates.

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 20 plants or parts of plants 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 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 seed-propagated varieties, a population standard of 3% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 60 plants, 4 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 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) Time of flowering (characteristic 6)
 - (b) Plant: height (characteristic 7)
 - (c) Petal: color (characteristic 9)
 - (d) Petal: change of color (characteristic 21)
- 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 All relevant states of expression are presented in the characteristic.

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

7 Growth stage key 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.	QN	MS	16			
	First leaf : length					
	very short					1
	short					2
	medium				Kanariengelb	3
	long					4
	very long					5
2.	QN	MS	16			
	First leaf : width					
	very narrow					1
	narrow					2
	medium				Kanariengelb, Salem	3
	broad					4
	very broad					5
3.	QN	MS	16			
	First leaf : ratio length/width					
	very low					1
	low					2
	medium				Salem	3
	high					4
	very high					5
4.	QN	VG	16			
	First leaf: number of spines					
	absent or very few				Catima	1
	few					2
	medium				Alarosa	3
	many					4
	very many					5

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.	QN	VG	(+)	16			
	First leaf: dentation						
	absent or very weak					Catima	1
	weak					Orange Ball	2
	medium						3
	strong						4
	very strong						5
6. (*)	QN	MG	(+)				
	Time of flowering						
	very early						1
	very early to early						2
	early					Orange Ball	3
	early to medium						4
	medium					Calin	5
	medium to late					Catima	6
	late						7
	late to very late						8
	very late						9
7. (*)	QN	MS		61-65			
	Plant: height						
	very short						1
	very short to short						2
	short						3
	short to medium					Goldschopf, Orange Ball	4
	medium						5
	medium to tall						6
	tall					Catima	7
	tall to very tall						8
	very tall						9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
8.	QN	MS	61-65			
	Plant: length of longest side branch					
	very short					1
	very short to short					2
	short					3
	short to medium				Goldschopf	4
	medium					5
	medium to long				Catima	6
	long					7
	long to very long					8
	very long					9
9. (*)	PQ	VG	61-65			
	Petal: color					
	white					1
	yellow				Calin	2
	orange				Catima	3
10.	QN	VG	61-65			
	Leaf: intensity of green color					
	very light					1
	light					2
	medium				Catima	3
	dark				Alarosa	4
	very dark					5
11. (*)	QN	MS	(a)	61-65		
	Leaf: length					
	very short					1
	very short to short					2
	short					3
	short to medium				Goldschopf	4
	medium					5
	medium to long				Alarosa	6
	long				Calin, Salem	7
	long to very long					8
	very long					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
12. (*)	QN	MS	(a)	61-65		
	Leaf: width					
	very narrow					1
	very narrow to narrow					2
	narrow					3
	narrow to medium				Alarosa	4
	medium				Orange Ball	5
	medium to broad				Salem	6
	broad					7
	broad to very broad					8
	very broad					9
13. (*)	QN	MS	(a)	61-65		
	Leaf: ratio length/width					
	very low					1
	very low to low					2
	low					3
	low to medium				Goldschopf	4
	medium				Salem	5
	medium to high				Calin	6
	high					7
	high to very high					8
	very high					9
14.	PQ	VG	(+)	(a)	61-65	
	Leaf: shape					
	oblong				Zanzibar	1
	ovate					2
	elliptic					3
	obovate				Calin, Salem	4

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
15.	QN	VG	(a)	61-65			
	Leaf: number of spines						
	absent or very few					Catima	1
	few					Orange Ball, Zanzibar	2
	medium						3
	many						4
	very many						5
16.	QN	VG	(+)	(a)	61-65		
	Leaf: dentation						
	absent or very weak					Catima	1
	weak					Calin, Goldschopf, Kanariengelb	2
	medium						3
	strong					Alarosa	4
	very strong						5
17. (*)	QN	MS	(+)	(b)	61-65		
	Bract: length						
	very short						1
	very short to short						2
	short						3
	short to medium					Catima	4
	medium					Zanzibar	5
	medium to long						6
	long					Alarosa, Salem	7
	long to very long						8
	very long						9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
18. (*)	QN	MS	(+)	(b)	61-65	
	Bract: width					
	very narrow					1
	very narrow to narrow					2
	narrow					3
	narrow to medium				Calin	4
	medium				Catima	5
	medium to broad				Zanzibar	6
	broad					7
	broad to very broad					8
	very broad					9
19. (*)	QN	MS		(b)	61-65	
	Bract: ratio length/width					
	very low					1
	very low to low					2
	low					3
	low to medium				Catima, Goldschopf, Zanzibar	4
	medium				Calin	5
	medium to high					6
	high					7
	high to very high					8
	very high					9
20. (*)	QN	VG		(b)	61-65	
	Bract: number of spines					
	absent or very few				Catima	1
	very few to few					2
	few				Calin	3
	few to medium					4
	medium					5
	medium to many				Salem	6
	many				Alarosa	7
	many to very many					8
	very many					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
21. (*)	QL	VG	65-67			
	Petal: change of color					
	absent				Kanariengelb	1
	present				Alarosa, Catima	9
22.	QN	MG	99			
	Seed: 1000 seed weight					
	very low					1
	very low to low					2
	low					3
	low to medium					4
	medium				Calin, Salem	5
	medium to high					6
	high				Catima	7
	high to very high					8
	very high					9

8. Explanations on the Table of Characteristics

8.1 *Explanations covering several characteristics*

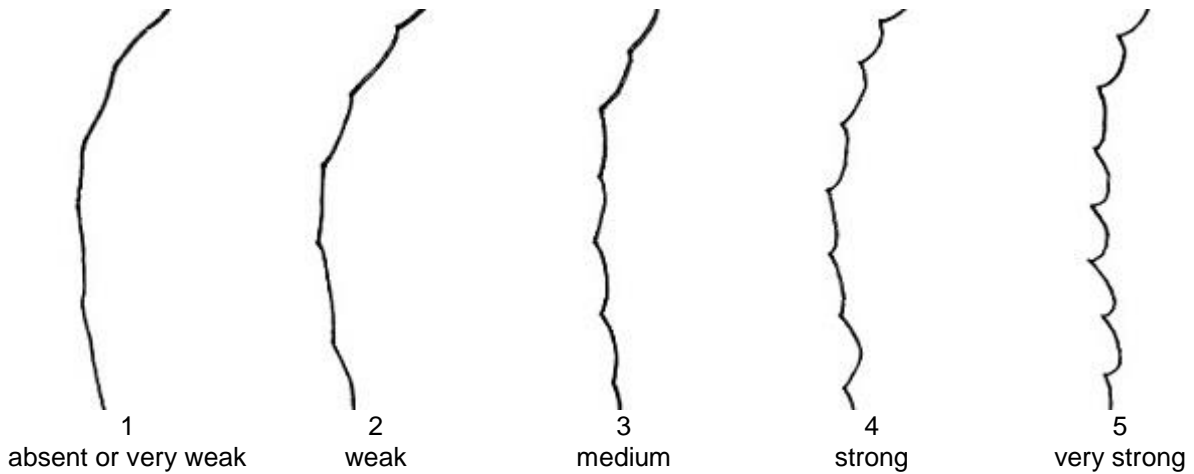
Characteristics containing the following key in the Table of Characteristics should be examined as indicated below:

- (a) Observations should be made on leaves from the fourth node from the top.
- (b) Observations should be made on middle bracts.



8.2 *Explanations for individual characteristics*

Ad. 5: First leaf: dentation



Ad. 6: Time of flowering

Time of flowering is reached when 50 % of plants have at least one open capitulum.

Ad. 14: Leaf: shape



1
fusiforme



2
ovate



3
elliptic

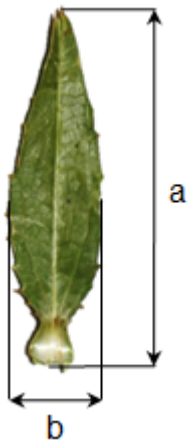


4
obovate

Ad. 16: Leaf: dentation

See Ad. 5

Ad. 17: Bract: length



a - length b - width

Ad. 18: Bract: width

See Ad. 17

8.3 *Phenological growth stages based on the general BBCH-scale (Meier, 2018)*

Principal growth stage 1: Leaf development

10: Cotyledons completely unfolded

12: 2 leaves unfolded

14: 4 leaves unfolded

16: 6 leaves unfolded

...

Principle growth stage 6: Flowering

61: Beginning of flowering: 10 % of open flowers

62: 20 % of flowers open

63: 30 % of flowers open

64: 40 % of flowers open

65: Full flowering: 50 % of flowers open

66: -

67: Flower declining: majority of petals fallen or dry

68: -

69: End of flowering: fruit set visible

Principle growth stage 9: Senescence

99: Harvested seed

9. Literature

Meier, U., 2018: Growth stages of mono- and dicotyledonous plants. BBCH-Monograph, German Federal Biological Research Centre for Agriculture and Forestry. <https://www.julius-kuehn.de/publikationsreihen-des-jki/bbch-skala/>

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	<input type="text" value="Carthamus tinctorius L."/>
1.2	Common name	<input type="text" value="Safflower"/>
2. Applicant		
	Name	<input type="text"/>
	Address	<input type="text"/>
	Telephone No.	<input type="text"/>
	Fax No.	<input type="text"/>
	E-mail address	<input type="text"/>
	Breeder (if different from applicant)	<input type="text"/>
3. Proposed denomination and breeder's reference		
	Proposed denomination (if available)	<input type="text"/>
	Breeder's reference	<input type="text"/>

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

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TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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4.2	Method of propagating the variety	
4.2.1	Other (Please provide details)	[]
	<input type="text"/>	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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 Time of flowering (6)		
very early		1 []
very early to early		2 []
early	Orange Ball	3 []
early to medium		4 []
medium	Calin	5 []
medium to late	Catima	6 []
late		7 []
late to very late		8 []
very late		9 []
5.2 Plant: height (7)		
very short		1 []
very short to short		2 []
short		3 []
short to medium	Goldschopf, Orange Ball	4 []
medium		5 []
medium to tall		6 []
tall	Catima	7 []
tall to very tall		8 []
very tall		9 []
5.3 Petal: color (9)		
white		1 []
yellow	Calin	2 []
orange	Catima	3 []
5.4 Petal: change of color (21)		
absent	Kanariengelb	1 []
present	Alarosa, Catima	9 []

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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
<i>Example</i>	<i>Time of flowering</i>	<i>early</i>	<i>late</i>

Comments:

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

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

.....

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]