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UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

*

HEMP

UPOV Code: CANNB_SAT

Cannabis sativa L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from the Netherlands

to be considered by the

Technical Working Party for Agricultural Crops
at its fourtieth session, to be held in Brasilia, Brazil, from May 16 to 20, 2011

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Cannabis sativa L.	Hemp	Chanvre	Hanf	Cáñamo

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 monoecious or dioecious seed-propagated varieties and vegetatively propagated varieties of *Cannabis sativa* 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 or young, non-flowering plants in pots, of sufficient size and with sufficient development to express all the characteristics of the variety in the first growing cycle.

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

Vegetatively propagated varieties: 50 young plants.
Seed-propagated varieties: 500 grams of seed.

2.4 In the case of seed, the seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority.

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

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

3. Method of Examination

3.1 Number of Growing Cycles

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

3.2 Testing Place

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

3.3 Conditions for Conducting the Examination

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

3.3.2 The optimum stage of development for the assessment of each characteristic is indicated by a number in the second column of the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.

3.4 Test Design

3.4.1 In the case of seed-propagated varieties, each test should be designed to result in a total of at least 200 plants, which should be divided between at least 2 replicates.

3.4.2 In the case of vegetatively propagated varieties, each test should be designed to result in a total of at least 40 plants.

3.4.3 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 on single plants should be made on 20 plants or parts taken from each of 20 plants and any other observations made on all plants in the test, disregarding any off-type plants.

4.1.5 Method of Observation

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

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

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

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

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

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

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

4.2 Uniformity

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

4.2.2 Seed-propagated varieties: the assessment of uniformity of seed-propagated varieties should be according to the recommendations for cross-pollinated varieties in the General Introduction. In case of monoecious varieties a population standard of 5 % and an acceptance probability of at least 95 % should be applied for male plants. In the case of a sample size of 200 plants, 15 male plants are allowed.

4.2.3 Vegetatively propagated varieties: 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 40 plants, 2 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 or 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.

The following have been agreed as useful grouping characteristics:

(a) Time of male flowering (characteristic 12)
(b) Inflorescence: THC content (characteristic 14)
(c) Plant: proportion of monoecious plants (characteristic 15)
(d) Plant: proportion of female plants (characteristic 16)
(e) Plant: proportion of male plants (characteristic 17)
(f) Plant: natural height (characteristic 18)

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

C: Additional test in greenhouse

(a), (b) See Explanations on the Table of Characteristics in Chapter 8.1
(+) See Explanations on the Table of Characteristics in Chapter 8.2
0003, etc. Growth stage – see 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. **(+)**	**0003 VG**	**Cotyledon: shape**	***DE proposes to delete as probably correlated with char. 10***				
QN	**C**	narrow obovate				Carmen, Uso 31	1
		medium obovate					2
		broad obovate				Ruby, Tegege	3
2.	**0003 VG**	**Cotyledon: color**	***DE proposes to delete as probably correlated with char. 10***				
PQ	**C**	yellow				Chameleon	1
		light green				Anka	2
		medium green					3
		dark green				Tegege	4
3.	**0003 VG**	**Hypocotyl: anthocyanin coloration**	***DE proposes to delete as probably correlated with char. 10***				
QN	**C**	weak				Glukhovskaya 18	3
		medium				Hlera	5
		strong				Zolotonoshskaya 15	7
4.	**1006 VG**	**Plant: intensity of anthocyanin coloration of crown**					
QN		absent or very weak					1
		weak				Glukhovskaya 33	3
		medium				Ermakovskaya	5
		strong				BundyGem, Dneprovskaya 14	7
		very strong					9

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
5.	**(a) VG**	**Leaf: intensity of green color**					
QN		light				Anka	1
		medium				Kinai egylaki	2
		dark				Carmen, Tegege, Tiborszállási	3
6. **(+)**	**(a) MS/ VG**	**Leaf: size of blade**	***DE proposes to delete as probably correlated with char. 10***				
QN	**(b)**	small				Finola	3
		medium				Carmen	5
		large				BundyGem	7
7.	**(a) MS**	**Leaf: length of petiole**					
QN	**(b)**	short				Anka, Ermakovskaya, Finola	1
		medium				Glukhovskaya 57, Tegege	2
		long				BundyGem, FibreGem, Glukhovskaya 33	3
8. **(*)**	**(a) VG**	**Leaf: anthocyanin coloration of petiole**					
QN	**(b)**	absent or very weak				Fibrol, Silistrenski	1
		weak				Ruby	2
		medium				Dioïca 88, Santhica	3
		strong				Epsilon 68, Futura 75, Tegege	4
		very strong					5

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
9. (*) (+)	**(a) MS/ VG**	**Leaf: number of leaflets**					
QN	**(b)**	few					1
		medium				Finola	2
		many				BundyGem	3
10.	**(a) MS**	**Central leaflet: length**					
QN	**(b)**	short				Fasamo	3
		medium				Dneprovskaya 11	5
		long				Glukhovskaya 10	7
11.	**(a) MS**	**Central leaflet: width**					
QN	**(b)**	narrow				Fasamo	3
		medium				Dneprovskaya 18	5
		broad				Glukhovskaya	7
12. (*) (+)	**MG**	**Time of male flowering**					
QN		very early				Finola	1
		early				Ruby	3
		medium				Tiborszállási	5
		late				Kompolti	7
		very late					9

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
13.	**2102 2304 VG**	**Inflorescence: anthocyanin coloration of male flowers**					
QN		absent or very weak				Kompolti	1
		weak				Carmen	3
		medium				Lovrin 110	5
		strong					7
		very strong					9
14. (*) (+)	**MG**	**Inflorescence: THC content**					
QN		absent or very low				Glukhovskaya 33, Hlera, Santhica 23	1
		medium				Carmen, Férimon, Uso 31	3
		very high				Grace, Krasnodarskaya, Medisins	5
15. (*) (+)	**2102 2202 2302 2304 VS**	**Plant: proportion of monoecious plants**					
QN		low					1
		medium					3
		high					5
16. (*) (+)	**2102 2202 2302 2304 VS**	**Plant: proportion of female plants**					
QN		low					1
		medium					3
		high					5

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
17. (*) (+)	**2102 2202 2302 2304 VS**	**Plant: proportion of male plants**					
QN		low					1
		medium					3
		high					5
18. (*) (+)	**2202 2302 VG/ MG**	**Plant: natural height**					
QN		short				Carmen, Finola, Uso 31	3
		medium				Glukhovskaya 33	5
		long				Dneprovskaya 11	7
19. (*)	**2202 2302 VG**	**Main stem: color**					
PQ	**(c)**	yellow				Chamaeleon, Glukhovskaya 10	1
		medium green				Hlera, Tiborszállási	2
		dark green				Kompolti, Zolotonoshskaya 11	3
		purple				Fibranova	4
20.	**2202 2302 MS**	**Main stem: length of internode**					
QN	**(c)**	short				Fasamo, Finola	3
		medium				Ruby, Sinelnikovskaya 3	5
		long				Dneprovskaya 11	7

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
21.	**2202 2302 MS/ VG**	**Main stem: thickness**					
QN	**(c)**	thin				Carmen	1
		medium				Dneprovskaya 11	2
		thick				Carmagnola, Deni	3
22. **(+)**	**2202 2302 VG**	**Main stem: depth of grooves**					
QN	**(c)**	shallow					1
		medium				Fedora 17, FibreGem	2
		deep				Ruby, Uso 31	3
23. **(+)**	**2204 2306 VG**	**Main stem: pith in cross-section**					
QN	**(c)**	absent or thin					1
		medium					2
		thick				Deni	3
24.	**2205 2307 MG**	**Seed: 1000 seed weight**					
QN		very low				Deni	1
		low				Fasamo	2
		medium				Kompolti, Uso 31	3
		high				Glukhovskaya 10	4
		very high					5

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
25.	**2205 2307 VG**	**Seed: color of testa**					
PQ		light grey				Glukhovskaya 10	1
		medium grey				Fibriko TC , Glukhovskaya 58, Lipko	2
		grey brown					3
		yellowish brown					4
		brown				Carmen, Secuieni 1	5
26. **(+)**	**2205 2307 VG**	**Seed: marbling**					
QN		weak				Anka, Glukhovskaya 10	1
		medium				Calavos, FibreGem, Kompolti	2
		strong				BundyGem, Glukhovskaya 58, Kepnock	3

8. Explanations on the Table of Characteristics

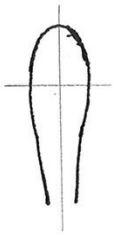
8.1 Explanations covering several characteristics

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

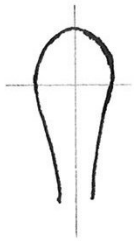
(a) Observations should be done in the period between the beginning of flowering (growth stage 2101, 2201 or 2301, whichever is earliest) and the beginning of seed maturity.
(b) Observations should be done on the last opposite, fully expanded leaves
(c) Observations should be done on the internode below the last opposite leaves of female and/or monoecious plants only.

8.2 Explanations for individual characteristics

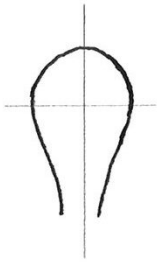
Ad. 1: Cotyledon: shape



ratio length/width: elongated
1
narrow obovate

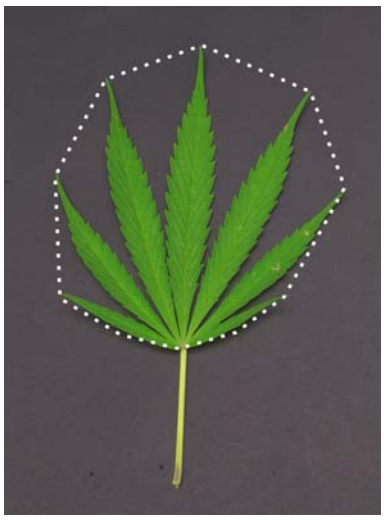


ratio length/width: medium
2
medium obovate



ratio length/width: compressed
3
broad obovate

Ad. 6: Leaf: size of blade



Size of the leaf blade is determined by the area within the contour.

Ad. 9: Leaf: number of leaflets

Medium number of leaflets is 7 (predominant number of leaflets). Few is less than 7 leaflets. Many is more than 7 leaflets.

Ad. 12: Time of male flowering

Dioecious varieties: 50% of all male plants with first staminate male flower open.
Monoecious varieties: 50% of all plants with first staminate male flower open.
First staminate flowers mostly appear from the axils of the leaves on the main stem. Staminate flowers usually appear about 2 weeks before the styles of pistillate female flowers are visible.

Ad. 14: Inflorescence: THC content

The method to determine the THC content is based on a quantitative determination of Δ^9-tetrahydrocannabinol by gas chromatography after extraction with a suitable solvent.

Sampling
The sample (mixture of 20 plants) should be taken from the upper 30 cm of the main stem, containing the female inflorescence. Sampling should be carried out in the period from 20 days after the beginning of female flowering up to the end of flowering. The sample should be dried as soon as possible (within 48 hours) at a temperature below 60º C. Samples should be dried to a constant weight and to a moisture content of 8 – 13 %. After drying samples can be stored (without crushing) at below 25º C in a dark place.

Determination of THC content (see also Cole, 2003).

1. Preparation of the test sample
Remove stems and seeds over 2 mm in size from the dried samples.
Grind the dried samples to obtain a semi-fine powder (passing through a 1 mm mesh sieve).
The powder may be stored for 10 weeks at below 25º C in a dark dry place.

2. Reagents and extraction solution
Reagents
- Δ^9-tetrahydrocannabinol, pure for chromatographic purposes.
- squalane, pure for chromatographic purposes, as an internal standard.

Extraction solution
- 35 mg of squalane per 100 ml hexane.

3. Extraction of Δ^9-tetrahydrocannabinol
Weigh 100 mg of the powdered test sample, place in a centrifuge tube and add 5 ml of extraction solution containing the internal standard.
Place in an ultrasound bath and leave for 20 minutes. Centrifuge for 5 minutes at 3000 r.p.m. and then remove the supernatant THC solution. Inject the solution into the chromatograph and carry out a quantitative analysis.

4. Gas chromatography
(a) Apparatus
- gas chromatograph with a flame ionization detector and a split/splitless injector

- column allowing good separation of cannabinoids, for example a glass capillary column 25 m long and 0,22 mm in diameter impregnated with a 5% non-polar phenyl-methyl-siloxane phase.
(b) Calibration ranges
At least three points including points 0,04 and 0,50 mg/ml Δ^9-THC in extraction solution.
(c) Experimental conditions
The following conditions are given as an example for the column referred to in a).
oven temperature 260º C
injector temperature 300º C
detector temperature 300º C
(d) Injection volume: 1 µl

Results
THC should be determined to two decimals in grams of Δ^9-THC per 100 grams of analytical sample dried to constant weight. A tolerance of 0,03 g per 100 grams applies. The results are expressed in % dry weight.

Although varietal differences for THC content are consistent, absolute levels of THC content are sensitive to environmental variation. States of expression need to be calibrated by Example varieties.

Ad. 15, 16 and 17: Plant: proportion of monoecious plants, female plants and male plants resp.

Cannabis sativa L. is normally dioecious, containing equal proportions of male and female plants. Monoecious plants (male and female flowers on one plant) occasionally occur naturally but are specially created by breeding activity (Bócsa, 1998). Several intersexual forms exist and sex expression can be modified by environmental factors.

Monoecious plants: plants with both male and female flowers
Female plants: plants with female flowers only
Male plants: plants with male flowers only

Proportion	Note	Ranges (percentage)
low	1	< 5 %
low to medium	2	5-34 %
medium	3	35-64 %
medium to high	4	65-94 %
high	5	> 94 %

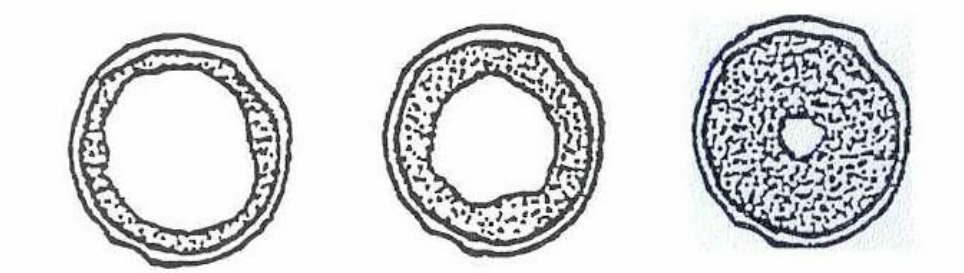
Proportion should be based on at least 200 plants.

Ad. 18: Plant: natural height

Natural height should be observed including inflorescence.

Ad. 23: Main stem: pith in cross-section

Observations to be taken on internode below the last opposite leaves



1	2	3
absent or thin	medium	thick

Ad. 26: Seed marbling

Marbling of testa: black mosaic patterns

1	2	3
weak	medium	strong

8.3 Growth stages for Hemp

All characteristics should be recorded at the appropriate time for the plant concerned. Growth stages of hemp are recorded by a four-digit code describing the principal growth stages, depending on the sex of the plant followed by detailed developmental stages (Mediavilla, Vito *et al.,* 1998):

Principal growth stages

Four principal stages describe the life cycle of a plant and are coded by their first digit of the four-digit code.

First-digit of code	Definition
0	Germination and emergence
1	Vegetative stage
2	Flowering and seed formation
3	Senescence

Secondary growth stages

The secondary growth stages are described by the second digit, which indicates the sex of the plant, the third and fourth digits indicating the developmental stage of the plant.

Code	Definition	Remarks
Germination and emergence		
0000	Dry seed	
0003	Cotyledons unfolded	
Vegetative stage refers to main stem. Leaves are considered unfolded when leaflets are at least one cm long		
1002	1st leaf pair	1 leaflet
1004	2nd leaf pair	3 leaflets
1006	3rd leaf pair	5 leaflets
10xx	Last opposite leaf pair	xx = 2 times nth leaf pair
Flowering and seed formation refers to the main stem including branches		
2000	GV point (i.e. induction of flowering)	Change of phyllotaxis on the main stem from opposite to alternate. Distance between petioles of alternate leaves at least 0.5 cm
2001	Flower primordia	Sex nearly indistinguishable
Dioecious plant		
	Male	
2100	Flower formation	First closed staminate flowers
2101	Beginning of flowering	First opened staminate flowers
2102	Flowering	50% opened staminate flowers
2103	End of flowering	95% of staminate flowers opened or withered
	Female	
2200	Flower formation	First pistillate flowers Bract with no styles
2201	Beginning of flowering	Styles on first female flowers
2202	Flowering	50% of bracts formed
2203	Beginning of seed maturity	First seeds hard
2204	Seed maturity	50% of seeds hard
2205	End of seed maturity	95% of seeds hard or shattered
Monoecious plant		
2300	Female flower formation	First pistillate flowers Perigonal bracts with no styles
2301	Beginning of female flowering	First styles visible
2302	Female flowering	50% of bracts formed
2303	Male flower formation	First closed staminate flowers
2304	Male flowering	50% opened staminate flowers
2305	Beginning of seed maturity	First seeds hard
2306	Seed maturity	50% of seeds hard
2307	End of seed maturity	95% of seeds hard or shattered
Senescence		
3001	Leaf dessication	Leaves dry
3002	Stem dessication	Leaves dropped
3003	Stem decomposition	Bast fibers free

9. Literature

Bócsa, I., 1998: Genetic Improvement : Conventional Approaches. In: Advances in Hemp Research. Paolo Ranalli (Ed.). Haworth Food Products Press, New York. 272 pp.

Bredemann, G., 1922 : Die Bestimmung des Fasergehaltes in Bastfaserpflanzen bei züchterischen Untersuchungen. Faserforschung 2. Leipzig : Hirzel Verlag. S. 239-258.

Clarke, R. C., 1998: Botany of the Genus *Cannabis.* In: Advances in Hemp Research. Paolo Ranalli (Ed.). Haworth Food Products Press, New York. 272 pp.

Cole, M.D., 2003. The analysis of controlled substances – a systematic approach. John Wiley and Sons Ltd., Chichester, UK. ISBN 0-471-49252-3.

Mediavilla, Vito, Manuel Jonquera.\, Ingrid Schmid-Slembrouck and Alberto Soldati, 1998. Decimal code for growth stages of hemp (*Cannabis sativa* L.). Journal of the International Hemp Association 5(2) : 67-72.

Meijer de, E., 1995: Fibre hemp cultivars : A survey of origin, ancestry, availability and brief agronomic characteristics. Journal of the International Hemp Association 2(2) : 66-73

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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	*Cannabis sativa* L.
1.2 Common name	Hemp

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)

4.2.2 Vegetatively propagated varieties

(a) cuttings [ ]

(b) *in vitro* propagation [ ]

(c) other [state method]

4.2.3 Other [ ]
(please provide details)

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

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

Single Hybrid

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

Three-Way Hybrid

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

(……..……..…) x (……..……..…)
single hybrid used as female parent male parent

and should identify in particular:

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

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

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

	Characteristics	Example Varieties	Note
5.1 (12)	**Time of male flowering**		
	very early	Finola	1[ ]
	very early to early		2[ ]
	early	Ruby	3[ ]
	early to medium		4[ ]
	medium	Tiborszállási	5[ ]
	medium to late		6[ ]
	late	Kompolti	7[ ]
	late to very late		8[ ]
	very late		9[ ]
5.2 (14)	**Inflorescence: THC content**		
	absent or very low	Santhica 23, Hlera, Glukhovskaya 33	1[ ]
	medium	Férimon, Carmen, Uso 31	3[ ]
	very high	Krasnodarskaya, Medisins, Grace	5[ ]

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

	Characteristics	Example Varieties	Note
5.3 (15)	**Plant: proportion of monoecious plants**		
	low		1[ ]
	low to medium		2[ ]
	medium		3[ ]
	medium to high		4[ ]
	high		5[ ]
5.4 (16)	**Plant: proportion of female plants**		
	low		1[ ]
	low to medium		2[ ]
	medium		3[ ]
	medium to high		4[ ]
	high		5[ ]
5.5 (17)	**Plant: proportion of male plants**		
	low		1[ ]
	low to medium		2[ ]
	medium		3[ ]
	medium to high		4[ ]
	high		5[ ]

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

	Characteristics	Example Varieties	Note
5.6 (18)	**Plant: natural height**		
	very short		1[ ]
	very short to short		2[ ]
	short	Carmen, Finola, Uso 31	3[ ]
	short to medium		4[ ]
	medium	Glukhovskaya 33	5[ ]
	medium to long		6[ ]
	long	Dneprovskaya 11	7[ ]
	long to very long		8[ ]
	very long		9[ ]

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	*Plant: natural height*	*short*	*long*

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

Main use

(a)	bast fibre and woody core	[ ]
(b)	oil seed	[ ]
(c)	pharmaceuticals	[ ]
(d)	other (please provide details)	[ ]

8. Authorization for release

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

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

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

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

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

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

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

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

(a) Microorganisms (e.g. virus, bacteria, phytoplasma) Yes [ ] No [ ]

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

(c) Tissue culture Yes [ ] No [ ]

(d) Other factors Yes [ ] No [ ]

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

……

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]