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ORIGINAL: English

DATE: June 18, 2001

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

**TECHNICAL WORKING PARTY
FOR
AGRICULTURAL CROPS**

**Thirtieth Session
Texcoco, Mexico, September 3 to 7, 2001**

WORKING PAPER ON REVISED TEST GUIDELINES FOR LUPINS

Document prepared by experts from South Africa

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I. Subject of these Guidelines

These Test Guidelines apply to all varieties of *Lupinus albus* L., *Lupinus angustifolius* L. and *Lupinus luteus* L.

II. Material Required

1. The competent authorities decide when, where and in what quantity and quality the plant material required for testing the variety is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must make sure that all customs formalities are complied with. Unless the competent authorities make an exception, the seed to be supplied for each examination must originate from the preceding growing season. The minimum quantity of seed to be supplied by the applicant in one or several samples should be

3 kg for *L. albus*
2,5 kg for *L. angustifolius* & *L. luteus*

The seed should at least meet the minimum requirements for germination capacity, moisture content and purity for marketing certified seed in the country in which the application is made. The germination capacity should be as high as possible.

2. The plant material must not have undergone any treatment unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

III. Conduct of Tests

1. The minimum duration of tests should normally be two independent growing cycles.
2. The tests should normally be conducted at one place. If any important characteristics of the variety cannot be seen at that place, the variety may be tested at an additional place.
3. The field tests should be carried out under conditions ensuring normal growth. The size of the plots should be such that plants or parts of plants may be removed for measurement and counting without prejudice to the observations which must be made up to the end of the growing period. Each test should include at least 300 plants which should be divided between two or more replicates. Separate plots for observation and for measuring can only be used if they have been subject to similar environmental conditions.
4. Additional tests for special purposes may be established.

IV. Methods and Observations

1. All observations for assessment of distinctness and stability should be made on 30 plants or parts taken from each of the 30 plants.

2. For the assessment of uniformity, a population standard of 1% with an acceptance probability of at least 95% should be applied unless otherwise indicated. In the case of a sample size of 300 plants, the maximum number of off-types allowed would be 6.

3. All observations on the grain should be made on fully mature pods.

V. Grouping of Varieties

1. The collection of varieties to be grown should be divided into groups to facilitate the assessment of distinctness. Characteristics which are suitable for grouping purposes are those which are known from experience not to vary, or to vary only slightly, within a variety. Their various states of expression should be fairly evenly distributed throughout the collection.

2. It is recommended that the competent authorities use the following characteristics for grouping varieties within the particular species:

- (a) Grain: bitter principle (characteristic 1)
- (b) Flower: color (characteristic 11)
- (c) Plant: growth type (characteristic 13)
- (d) Grain: color of ornamentation (characteristic 17)

VI. Characteristics and Symbols

1. To assess distinctness, uniformity and stability, the characteristics and their states as given in the Table of Characteristics should be used.

2. Notes (numbers), for the purposes of electronic data processing, are given opposite the states of expression for each characteristic.

3. Legend

(*) Characteristics that should be used on all varieties in every growing period over which examinations are made and should always be included in the variety descriptions, except when the state of expression of a preceding characteristic or regional environmental conditions render this impossible.

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

1) The letters indicate the following:

- C: special test
- M: actual measurement
- VG: visual assessment by a single observation of a group of plants or parts of plants
- VS: visual assessment by observations of a number of individual plants or parts of plants

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

	Stage ¹⁾ Stade ¹⁾ Stadium ¹⁾ Estado ¹⁾	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. (* (+)	C	Grain: bitter principle	absent				1
			present				9
2. (* (+)	VG	Plant: height three weeks after seedling emergence	short				3
			medium				5
			tall				7
3. (* (+)	VG	Plant: growth habit during flower bud stage	upright				1
			semi-upright				3
			intermediate				5
			spreading				7
			prostrate				9
4. (* (+)	VG	Leaf: green color during flower bud stage	light				3
			medium				5
			dark				7

Stage Stade Stadium Estado ¹⁾	¹⁾ English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5. VG (*)	Stem: anthocyanin coloration during flower bud stage	absent or very weak				1
		weak				3
		medium				5
		strong				7
		very strong				9
6. M (*)	Plant: height at beginning of flowering	short				3
		medium				5
		tall				7
7. M	Plant: height of insertion of 1st inflorescence at green ripening (from ground level to insertion of 1st inflorescence)	low				3
		medium				5
		high				7
8. M (*) (+)	Plant: height at green ripening	very short				1
		short				3
		medium				5
		tall				7
		very tall				9

Stage Stade Stadium Estado ¹⁾	¹⁾ English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota	
9. (*) (+)	M	Terminal leaflet: length					
		very short					1
		short					3
		medium					5
		long					7
very long					9		
10.	M	Terminal leaflet: width					
		very narrow					1
		narrow					3
		medium					5
		broad					7
very broad					9		
11. (*) (+)	VG	Flower: color					
		white					1
		bluish white					2
		blue					3
		violet					4
		pink					5
		yellow-green					6
		yellow					7
		yellow-brown					8
orange					9		

Stage Stade Stadium Estado ¹⁾	¹⁾ English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota	
12. (*)	VG	Flower: color of tip of carina					
		yellow					1
		red purple					2
		blue black					3
13. (*) (+)	VG	Plant: growth type					
		determinate					1
		indeterminate					2
14. (+)	M	Pod: length					
		short					3
		medium					5
		long					7
15. (*)	VG	Grain: ground color					
		white					1
		beige					2
		grey					3
16. (*) (+)	VS	Grain: ornamentation					
		absent					1
		present					9

Stage Stade Stadium Estado ¹⁾	¹⁾ English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17. VS (*)	Grain: color of ornamentation					
	beige					1
	brown					2
	grey					3
	black					4
	multicolored					5
18a. VS (+)	Grain: distribution of ornamentation					
	total					1
	total except eyebrow					2
	total and eyebrow					3
	dorsal					4
	ventral					5
	eyebrow					6
18b. VS	Grain: size of eyebrow (only varieties with eyebrow)					
	small					3
	medium					5
	large					7

	Stage Stade Stadium Estado ¹⁾	¹⁾ English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
19.	VS	Grain: density of ornamentation (excluding varieties with eyebrow only)					
(+)		very sparse					1
		sparse					3
		medium					5
		dense					7
		very dense					9
20.	M	Grain: 1000 seed weight					
		very low					1
		low					3
		medium					5
		high					7
		very high					9
21.	VS	Time of beginning of flowering					
(*)	VG						
(+)		early					3
		medium					5
		late					7
22.	VG	Time of green ripening					
(+)		early					3
		medium					5
		late					7

	Stage ¹⁾ Stade ¹⁾ English Stadium ¹⁾ Estado ¹⁾	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23.	VG	Time of ripening				
(+)						
		early				3
		medium				5
		late				7

VIII. Explanations on the Table of Characteristics

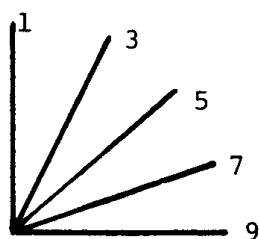
Ad. 1: Grain: bitter principle

The bitter principle should be assessed on the seed sent in for testing. The test should be restricted to the qualitative proof of bitter grains in the sample. The uniformity tolerance should be 1 grain in 100 grains. The Grain-Cut-Method after v. Sengbusch (1042), Ivanov and Smirnova (1932) and Eggebrecht (1949) is applicable as the testing method to *Lupinus albus*, *Lupinus angustifolius* and *Lupinus luteus*. The dry or swollen grains are cut transversely. The grain halves are dipped on a sieve for 10 seconds in an iodine solution and then rinsed for 5 seconds with water. The cut surfaces of the bitter grains discolor to brown but those of the grains low in alkaloids remain yellow.

For the preparation of the iodine solution 14g potassium iodate are dissolved in as little water as possible, 10g iodine is added and with water made up to 100cm³. The solution has to be left for one week before it can be used. Storage in brown bottles. This main solution is diluted between 1 to 3 and 1 to 5 before being used.

Ad. 3: Plant: growth habit during flower bud stage

The growth habit should be assessed visually during flower bud stage from the attitude of the side branches. The angle formed by the outer side branches with an imaginary middle axis should be used. The states of expression should be determined as follows:



- upright (1)
- semi-upright (3)
- intermediate (5)
- spreading (7)
- prostrate (9)

Ad 9, 10: Terminal leaflet: length and width

All observations on the leaf should be made at the time of full flowering on the terminal leaflet of the leaf just below the uppermost branch carrying flowers.

Ad 11, 12: Flower: color and color of tip of carina

All observations on the flower should be made at the time of full flowering.

Ad 13: Plant: growth type



1

determinate



2

indeterminate

Ad. 14: Pod: length

All observations should be made on pods at green maturity, in middle third of the main inflorescence.

Ad. 16: Grain: ornamentation

Ornamentation means well-defined dots different from the ground color. They should be assessed at full maturity of the grain.

Ad. 18: Grain: distribution of ornamentation



1
total



2
total except eyebrow



3
dorsal



4
ventral



5
eyebrow

Ad. 19: Grain: intensity of ornamentation



1
very weak



3
weak



5
medium



7
strong



9
very strong

Ad. 21: Time of beginning of flowering

To assess the time of beginning of flowering, the date should be recorded when the flower buds on the main shoot of about 30% of the plants in the plot have begun to open.

Ad. 8 & 22: Plant: height at green ripening (8) and Time of green ripening (22)

To assess the time of green ripening, the date should be recorded when the grains in the pods of the main shoot have reached full size (milky ripeness) and the grains in the pod can be dented with the thumbnail.

Ad. 23: Time of ripening

To assess the time of ripening, the date should be recorded when the grains in the pods of the main shoot can no longer be dented by thumbnail.

IX. Literature

- Eggebrecht, H.: Methodenbuch Band V. Die Untersuchung von Saatgut, Radebeul und Berlin. 1949.
- IBPGR Secretariat: Lupin Descriptor, Rome 1981.
- Julier, B.: Etude génétique et physiologique de l'architecture déterminée chez le Lupin blanc d'hiver. Conséquences agronomiques et en sélection. Thèse. 1994.

X. Technical Questionnaire

		Reference Number (not to be filled in by the applicant)	
TECHNICAL QUESTIONNAIRE			
To be completed in connection with an application for plant breeders' rights			
1.	Species	<i>Lupinus albus</i> L. (White lupin)	[]
		<i>Lupinus angustifolius</i> L (Blue lupin, Narrow leaf lupin)	[]
		<i>Lupinus luteus</i> L. (Yellow lupin)	[]
2.	Applicant (Name and address)		
3.	Proposed denomination or breeder's reference		

4. Information on origin, maintenance and reproduction of the variety

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

Characteristics	Example Varieties	Note
5.1 Grain: bitter principle (1)		
absent		1[]
present		9[]
5.2 Stem: anthocyanin coloration during flower bud stage (5)		
absent or very weak		1[]
weak		3[]
medium		5[]
strong		7[]
very strong		9[]

Characteristics	Example Varieties	Note
5.3 Flower: color (11)		
white		1[]
bluish white		2[]
blue		3[]
violet		4[]
pink		5[]
yellow-green		6[]
yellow		7[]
yellow-brown		8[]
orange		9[]
5.4 Plant: growth type (13)		
determinate		1[]
indeterminate		2[]
5.5 Grain: ornamentation (at full maturity) (16)		
absent		1[]
present		9[]
5.6 Time of beginning of flowering (quote mean date of beginning of flowering of variety as well as of two well-known comparable varieties) (21) 		

6. Similar varieties and differences from these varieties

Denomination of
similar variety

Characteristic in
which the similar
variety is different °)

State of expression of
similar variety

State of expression of
candidate variety

°) In the case of identical states of expressions of both varieties, please indicate the size of the difference.

7. Additional information which may help to distinguish the variety

7.1 Resistance to pests and diseases

7.2 Special conditions for the examination of the variety

7.3 Other information

8. Authorization for release

- (a) Does the variety require prior authorization for the 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 that question is yes, please attach a copy of such an authorization.

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