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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

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WORKING PAPER ON TEST GUIDELINES FOR HORSE RADISH
(*Armoracia rusticana* Gaertn. Mey. et Scherb)

Document prepared by experts from Hungary

I. Subject of these Guidelines

These Test Guidelines apply to all varieties of *Armoracia rusticana* Gaertn, Mqy.et Scherb.

II. Material Required

1. The competent authorities decide when, where and in what quantity and quality the plant material required for testing the variety 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. The minimum quantity of plant material to be supplied by the applicant in one or several samples should be:

100 root stocks

The plant material (root stocks) supplied should be 300 mm in length and 8- 10 mm in diameter visibly healthy, not lacking in vigor or affected by any important pest or disease. It must in particular be free from visually recognizable virus diseases and nematodes.

Remark from D: diameter should be 10-20 mm

H: root stock diameter has great influence on root diameter (Char, 18. and 19). Keep 8-10 mm for root stock diameter.

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 similar growing periods with a planting time in spring.

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 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. As a minimum each test should include 80 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 determined by measurement or counting should be made on 20 plants or parts taken from each of 20 plants.

2. For the assessment of uniformity a population standard of 1% with an acceptance probability of at least 95% should be applied. In the case of a sample size of 80 plants the maximum number of off types allowed would be 2.
3. Unless otherwise indicated, all observations on the leaf blade should be made on the fourth fully developed leaf. All observations on the incised leaf should be made on the first incised leaf. All observations on rhizome should be made on the fully developed rhizome. The number of shoots should be observed on fully developed rhizomes after forcing in wet sand.

V. Grouping of Varieties

- I. 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:
 - (a) Leaf blade: shape (characteristic 1)
 - (b) Leaf: petiole anthocyanin coloration at base (characteristic 14)
 - (c) Rhizome: shape (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 the different characteristics.
3. Legend
 - (*) Characteristics that should be used on all varieties in every growing period over which the examinations are made and 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.

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

Stage ¹⁾ Stade ¹⁾ Stadium ¹⁾ Estadio ¹⁾	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. (* (+)	Leaf blade: shape					
	narrow elliptic				(Brassói)	1
	elliptic				Bagaméri 93/1	2
	broad elliptic				(Tel-Avivi)	3
	converse heart shape				Danvit	4
2.	Leaf blade: length					
	short				Bagaméri Delikat, (Kolozsvari)	3
	medium					5
	long				(Grazi)	7
3. (+)	Leaf blade: width (at the widest point)					
	narrow					3
	medium					5
	broad					7
4.	Leaf blade: length / width ratio					
	small					3
	medium					5
	large					7

Stage Stade Stadium Estadio ¹⁾	¹⁾ English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5. (*)	Leaf blade: intensity of green color					
	light				(Steierische)	3
	medium				Danvit	5
	dark				Bagaméri 93/1	7
6. (*)	Leaf blade: glossiness of upper side					
	absent or very weak				(Grazi)	1
	weak					3
	medium				Danvit	5
	strong				Bagaméri 93/1	7
	very strong				(Koložrvári)	9
7. (*)	Leaf blade: curvature (twisting) of tip					
	absent or very weak				Danvit	1
	weak					3
	medium				Pózna	5
	strong					7
	very strong				Bagaméri 93/1	9
8. (*)	Leaf blade: glaucosity					
	absent or very weak				(Steierischer)	1
	weak				(Bihari)	3
	medium				Nemes, Pózna	5
	strong					7
	very strong					9

Stage Stade Stadium Estadio	1) English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9. (*)	Leaf blade: undulation of margin					
	absent or very weak				Danvit	1
	weak					3
	medium				Pózna	5
	strong				Bagaméri 93/1	7
	very strong				(Eperjesi)	9
10. (*)	Leaf blade: incisions					
	very weak				(Grazi, Lucsonyi)	1
	weak				Pózna	3
	medium				Bagaméri 93/1	5
	strong					7
	very strong				(Eperjesi)	9
11.	Leaf: color of main vein					
	whitish				Bagaméri 93/1, Pózna	1
	light green				Danvit	2
	green				(Steierische)	3
12.	Leaf: petiole length					
	short				Pózna	3
	medium				Bagaméri Delikát	5
	long					7

Stage Stade Stadium Estadio ¹⁾	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
13.	Leaf: petiole width					
	small				Bagaméri Delikát	3
	medium				Danvit	5
	large					7
14. (*)	Leaf: petiole anthocyanin coloration at base					
	absent					1
	present				(Rzezowi)	9
<i>Remark from D. Plant: anthocyanin coloration of young leaves in Spring H: Joined characteristic <u>Easier to assess at this stage</u></i>						
15. (*)	Time of appearance of first incised (secondary) leaves					
	early				Bagaméri 93/1	3
	medium				Pózna	5
	late				Danvit	7
16. (*)	Incised (secondary) leaves: incisions of the margin					
	absent or very weak					1
	weak					3
	medium					5
	strong					7
	very strong					9

Stage Stade Stadium Estadio ¹⁾	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17. (* (+)	Rhizome: shape					
	conical				Pózna	1
	slight obtirangular					2
	obtriangular				Danvit	3
18.	Rhizome: curvature					
	straight				Pózna	1
	slightly curvate				(Nagykőrosi)	2
	strongly curvate				(Daroczfaloi)	3
19. (+)	Rhizome: diameter at the widest point					
	small					3
	medium				Bagaméri Delikát, Pózma	5
	large				Danvit	7
20.	Rhizome: diameter at the footroots					
	small					3
	medium				Pózna	5
	large				Bagaméri 93/1	7
21.	Rhizome: weight					
	small					3
	medium				Pózna	5
	large				Danvit	7

Stage Stade Stadium Estadio ¹⁾	¹⁾ English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
22.	Rhizome: surface					
	fine				Bagaméri 93/1	3
	medium					5
	rough					7
23.	Rhizome: root hairs					
	weak				Bagaméri 93/1	3
	medium					5
	strong					7
<i>D proposal</i>						
<i>H remark: depends very much on soil moisture and harvest time</i>						
24.	Rhizome: inner color					
	whitish				Bagaméri 93/1	1
	yellowish				(Batai)	2
25.	Rhizome: brownish coloration inside the root					
	absent or very weak				Bagaméri 93/1	1
	weak				Danvit	3
	medium					5
	strong					7
	very strong					9
26.	Rhizome: side root: formation (at the upper third)					
	weak					3
	medium					5
	strong				(Brassói)	7

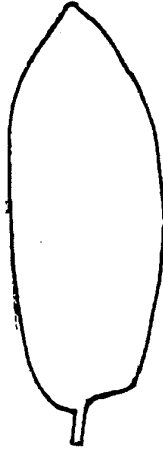
Stage Stade Stadium Estadio	1) 1) 1) 1)	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
27.		Rhizome: foot root formation					
		weak				Bagaméri 93/1	3
		medium				Bagaméri Delikát	5
		strong				Pózna	7
28. (* (+)		Rhizome: predominant number of shoots on the crown					
		one or two				Pózna, (Bayerischer)	3
		two or three				Bagaméri 93/1	5
		more than three				(Brassói)	7
29		Stem: height (at fully flowering stage)					
		small				Bagaméri Delikát	3
		medium					5
		high				Pózna	7

VIII. Explanation on the Table of Characteristic

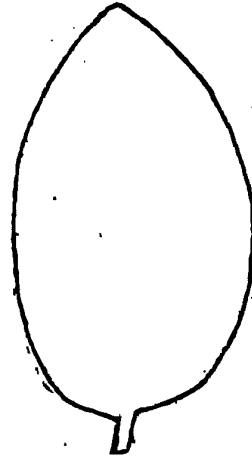
Ad. 1.: Leaf blade: shape



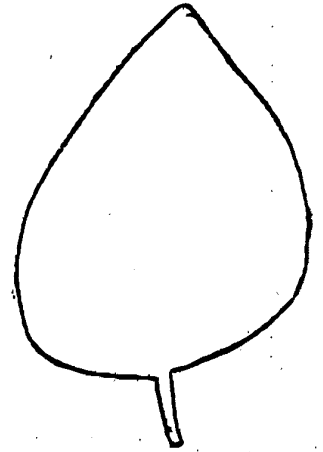
1
narrow elliptic



2
elliptic



3
broad elliptic



4
converse heart shape

Ad. 17. 19. 20.

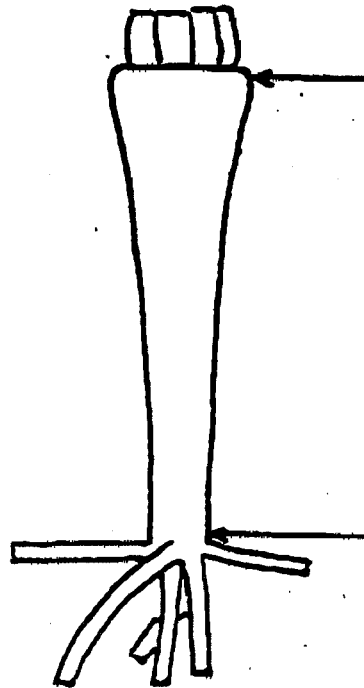
Rhizome: shape (17)



1
conical



2
slight obtriangular



Rhizome:
diameter at the
widest point
(19)

Rhizome:
diameter at the
foot roots (20)

3
obtriangular

Ad 28. Rhizome: predominant number of shoots on the crown

Hungarian method:

Twenty fully developed rhizomes should be put vertically in wet sand and kept at 15°-17°C for two weeks. The shoots developed on the crown can be counted.

German method:

Leaves are cut with 1 cm petiole left above the crown of the rhizome, and the shoot primordia are counted,

IX. Literature

I Becker - Dillingen: 1956 Handbuch des Gesamten

Gemüsebaues Paul Parey in Berlin und Hamburg

Géczi L. 1999: A. torma Mezőgazda Kiadó

X. Technical Questionnaire

	Reference Number (not to be filled in by the applicant)
<p>TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights</p>	
1. Species	<p><i>Armoratia rusticana</i> Gaertn. Mey et Scherb. HORSE RADISH</p>
2. Applicant (Name and address)	
3. Proposed denomination or breeder's reference	

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

4.1 Origin and breeding method

- (a) natural clone []
- (b) clone from *in vitro* culture []
- (c) clone from seedlings []
- (d) discovery (indicate where and when) []

.....

4.2 Other information

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 Leaf blade: shape (1)		
narrow elliptic	(Brassói)	1[]
elliptic	Bagaméri 93/1	2[]
broad elliptic	(Tel-Avivi)	3[]
converse heart shape	Danvit	4[]
5.2 Leaf blade: curvature (twisting) of tip (7)		
absent or very weak	Danvit	1[]
weak		3[]
medium	Pózna	5[]
strong		7[]
very strong	Bagaméri 93/1	9[]
5.3 Leaf blade: incisions (10)		
very weak	(Grazi, Lucsonyi)	1[]
weak	Pózna	3[]
medium	Bagaméri 93/1	5[]
strong		7[]
very strong	(Eperjesi)	9[]
5.4 Leaf: petiole anthocyanin coloration at base (14)		
absent		1[]
present	(Rzezowi)	9[]

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
5.5 Rhizome: shape (17)		
conical	Pózna	1[]
slight obtriangular		2[]
obtriangular	Danvit	3[]
5.6 Rhizome: predominant number of shoots on the crown (28)		
one or two	Pózna, (Bayerischer)	1[]
two or three	Bagaméri 93/1	2[]
more than three	(Brassói)	3[]

6. Similar varieties and differences between these varieties

Denomination of similar variety	Characteristic in which the similar variety is different ^{o)}	State of expression of similar variety	State of expression of candidate variety

^{o)} 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 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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